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Flora
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FLORA OF BERMUDA

(ILLUSTRATED)

BY

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"Oh! could you view the scenery dear,
That now beneath my window lies,
You'd think, that Nature lavish'd here
Her purest wave, her softest skies."

T. Moore

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SYMBOLS USED

° is used after figures to indicate feet.

′ is used after figures to indicate inches.

″ is used after figures to indicate lines, or twelfths of an inch.

′ over syllables indicates the accent, and the *short* English sound of the vowel.

` over syllables indicates the accent, and the long, broad, open or close English sound of the vowel.

IN THE METRIC SYSTEM.

The metre = 39.37 inches, or 3 feet 3.37 inches.
The decimetre = 3.94 inches.
The centimetre = $\frac{2}{5}$ of an inch, or 4$\frac{3}{4}$ lines.
The millimetre = $\frac{1}{25}$ of an inch, or $\frac{1}{2}$ a line.
2$\frac{1}{2}$ millimeters = 1 line.

} very nearly.

INTRODUCTION

The islands forming Bermuda, or the Bermudas, are an isolated group in the Atlantic Ocean, in north latitude 32° 14′ to 32° 23′ (Castle Island is 32° 20′), and in west longitude 64° 38′ to 64° 52′ (Castle Island is almost exactly 64° 40′). The nearest land is Cape Hatteras on the coast of North Carolina, distant about 568 nautical miles; the distance to Halifax is about 736 nautical miles, to Sandy Hook 666 nautical miles, to Charleston about 700 nautical miles, and to Abaco, the nearest West Indian island of the Bahama archipelago, about 700 miles to the southwest, to St. Thomas about 800 miles to the southeast.

The land area of Bermuda is a little over nineteen square land miles, or approximately one-fourth the size of Staten Island, New York, or about one-seventh the size of the Isle of Wight. There is a main island containing perhaps three-quarters of the entire area, five islands each half a square mile in area or more, some sixty little islands or cays, and many more rocks or ledges projecting above the water. The islands are all close together. The Bermuda banks or shoals, stretching northward and westward from the islands, are of much greater area than the present land.

The general outline of the archipelago is irregularly oblong, more accurately fishhook-shaped, its longer axis lying northeast and southwest, with a length of about fifteen land miles and a width near the middle (across Pembroke and Paget) of about three land miles, but across the tip of the fishhook from Ireland Island to the south shores of Warwick the distance is about five land miles; the average width is somewhat less than one and a half land miles.

The rocks of Bermuda are wholly aeolian limestone, of recent geologic age, and the soil has been entirely derived from the weathering and disintegration of this limestone. The topography is hilly, with local broad valleys occupied by fresh water or brackish marshes, salt water bays and lagoons. The highest points above the sea are about 250 feet elevation.

Like many other portions of the earth, Bermuda has been subject to alternate uplifts and depressions; the last vertical movement has apparently been one of depression; the land area was therefore probably greater formerly than it is now; possibly the area now occupied by the banks to the north and west of the islands was land during some previous geologic period. These islands and banks are the top of an insular mountain system or plateau, separated from all others by the abysses of the ocean, and there is no evidence which justifies any assumption that it was ever connected with other regions by land.

The limestone cap is formed of the débris of various lime secreting animals and plants, segregated during periods of submersion, comminuted and eroded by wind and wave action during periods of emergence. In the course of a deep well boring, made a few years ago in the parish of Southampton, at a point about 200 feet above sea level, this limestone cap was penetrated and found to rest upon rocks of volcanic origin. "Of the 1400 feet penetrated by the boring, the first 360 feet are in the limestones of the usual character known in Bermuda. Below them for 200 feet, soft yellowish to brown, often clay-like rocks are met, whose nature indicates that they are more or less decomposed volcanic tuffs. Below them blackish to gray compact volcanic rocks are found, of andesitic and basaltic appearance. The study of the section made from a chip indicates that this is a lava, and, though considerably altered, an augite-andesite. This rock continues without essential change in character for the further 800 feet penetrated."* It was a great disappointment to the promoters of this interesting boring that no supply of water was obtained.

The limestone contains locally numerous caves and caverns, formed by the slow leaching of the more soluble portions by the infiltration of rain water. Some of these caves are of large extent and of great interest and beauty. The surface erosion of the limestone has been very irregular, forming many picturesque cliffs. The most rugged region is the neck of land separating Castle Harbor from Harrington Sound, and here the larger caves occur. Many of the native plants are now restricted to this region, presumably because it has been less modified by man than other parts of Bermuda, and also because the numerous pockets of soil in dense shade provide a suitable home for many of the rarer species. Governor Lefroy thought this (Walsingham tract) geologically older than the rest of the land area, "the last surviving contemporary of former Bermudas that have disappeared, whose surface rocks form the reefs that fill Castle Harbor and both the sounds."†

The soil is calcareous throughout its extent, sandy over parts of the island, especially along the south coasts. The numerous swales among the hills contain a rich, red, slightly clayey soil, resulting from the leaching of the hillsides and the deposit in the swales of the less soluble portions of the rock; the soil of fresh-water marshes is black or brown, covered by humus, and is either sandy or slightly clayey. There are, locally, salt marshes and mangrove swamps, and, especially along the coasts, some stretches of white sand-beaches.

Climatic conditions are favorable to the growth of subtropical and warm temperate vegetation. Frost is nearly but not quite impossible;

* L. V. Pirsson and T. Wayland Vaughan, Amer. Jour. Sci. 36: 70, 71. 1913.

† Bull. U. S. Nat. Mus. 25: 40.

there are a few authenticated records; hail has also been experienced at long intervals.

The native plants of Bermuda have originated from seeds or other parts brought from the American mainland or the West Indies by the natural agencies of wind, ocean currents and birds. About 80 per cent. of the native land plants inhabit the West Indies or southern Florida or both. About 8.7 per cent. of the total native flora is endemic, there being 61 species in Bermuda or its waters not known to grow naturally anywhere else in the world. These plants are of the greatest interest to naturalists, as they presumably developed in Bermuda from related plants formerly existing but now mostly extinct here; some of them may yet be found elsewhere as botanical exploration proceeds. These true Bermudians are as follows:

Eleocharis bermudiana Britton (p. 52)
Carex bermudiana Hemsley (p. 55)
Sabal Blackburnianum Glazebrook (p. 56)
Sisyrinchium Bermudiana Linnaeus (p. 84)
Peperomia septentrionalis S. Brown (p. 94)
Phaseolus lignosus Britton (p. 183)
Elaeodendron Laneanum A. H. Moore (p. 223)
Ascyrum macrosepalum S. Brown (p. 245)
Chiococca bermudiana S. Brown (p. 362)
Erigeron Darrellianus Hemsley (p. 393)
Juniperus bermudiana Linnaeus (p. 410)
Adiantum bellum T. Moore (p. 420)
Diplazium Laffanianum (Baker) Christensen (p. 423)
Dryopteris bermudiana (Baker) Gilbert (p. 426)
Dryopteris speluncae (Linnaeus) Underwood (p. 426)
Campylopus bermudianus R. S. Williams (p. 433)
Trichostomum bermudianum Mitten (p. 438)
Thelidium Farlowi Riddle (p. 471)
Thelidium bermudanum (Tuckerman) Riddle (p. 472)
Anthracothecium tetraspermum Riddle (p. 472)
Opegrapha ophites Tuckerman (p. 473)
Gyalecta Farlowi Tuckerman (p. 475)
Bilimbia Brittoniana Riddle (p. 475)
Psorotichia bermudana Riddle (p. 476)
Collema bermudanum Tuckerman (p. 476)
Collema thamnodes Tuckerman (p. 476)
Lecanora bermudensis Nylander (p. 477)
Ascophanus bermudensis Seaver (p. 485)
Calonectria granulosa Seaver (p. 485)
Calonectria Umbelliferarum Seaver (p. 485)

Nectria Lantanae Seaver (p. 485)
Hirneola coffeicolor Berkeley (p. 488)
Marasmius bermudensis Berkeley (p. 488)
Marasmius praedecurrens Murrill (p. 488)
Marasmius Sabali Berkeley (p. 488)
Pleurotopsis niduliformis Murrill (p. 488)
Tyromyces graminicola Murrill (p. 488)
Agaricus alphitophorus Berkeley (p. 488)
Agaricus helictus Berkeley (p. 488)
Boodlea struveoides M. A. Howe (p. 496)
Cladophora Howei Collins (p. 497)
Chaetomorpha minima Collins & Hervey (p. 498)
Trichogloea Herveyi Setchell (p. 511)
Nitophyllum Wilkinsoniae Collins & Hervey (p. 517)
Chondria curvilineata Collins & Hervey (p. 519)
Chondria polyrhiza Collins & Hervey (p. 520)
Lophosiphonia Saccorhiza Collins & Hervey (p. 521)
Dasya Collinsiana M. A. Howe (p. 524)
Dasya spinuligera Collins & Hervey (p. 525)
Ptilothamnion bipinnatum (Collins & Hervey) M. A. Howe (p. 525)
Spermathamnion macromeres Collins & Hervey (p. 526)
Callithamnion Herveyi M. A. Howe (p. 528)
Seirospora purpurea M. A. Howe (p. 529)
Ceramium leptozonum M. A. Howe (p. 531)
Halymenia bermudensis Collins & Howe (p. 533)
Halymenia pseudofloresia Collins & Howe (p. 533)
Halymenia echinophysa Collins & Howe (p. 533)
Dudresnaya crassa M. A. Howe (p. 534)
Dudresnaya bermudensis Setchell (p. 535)
Nemastoma gelatinosum M. A. Howe (p. 536)
Melobesia bermudensis Foslie (p. 538)

The number of native species known, those that have reached Bermuda independently of human activities, at least here so regarded, and have perpetuated themselves, including the foregoing list of endemics, is as follows:

	Species
Flowering plants	146
Ferns and fern allies	19
Mosses and hepatics	51
Lichens	80
Algae	238
Fungi	at least 175
Total	709

As regards the fungi, still incompletely known, it is impossible to determine, in the cases of many species, whether they are natives or introduced, but a large proportion of those known appear to be indigenous. Some, which are parasitic on cultivated plants, have probably been introduced.

Some native species have almost certainly been exterminated, certain of the older records indicating that this is the case. On the other hand, a few species appear to have reached Bermuda recently through natural agencies.

The number of introduced and completely or partially naturalized species, those which have reached Bermuda through human activities, at least here so regarded, and have perpetuated themselves, is about 303. In some cases, it is now impossible to determine whether some plants have reached Bermuda naturally or otherwise, and in these cases the reference to one or the other group has been made by considerations of occurrence, taken together with Lefroy's opinions of forty-five years ago. Some of the naturalized species are so abundant and appear so much like native plants in their habitats that if it were not for definite records proving their introduction by man they would be taken for native plants.

The number of species of cultivated plants which either grow now in Bermuda or are recorded as having grown here, described or mentioned in the following pages, is 864. Additions to these are made from time to time, principally by flower-lovers, and doubtless many have been grown of which no record has been kept; some probably exist which it has not been my privilege to observe, and, doubtless, many grown in previous years have disappeared.

In this book will be found descriptions and illustrations of all the kinds of native and more or less completely naturalized, introduced plants of the phyla Spermatophyta (seed-bearing plants), Pteridophyta (ferns and fern allies), and Bryophyta (mosses and hepatics) known to inhabit Bermuda, being 519 species in all. Accounts, not illustrated, are given of the lichens, fungi and algae.

A bibliography, a glossary, and an account of botanical collections made in Bermuda are appended.

Botanical Classification accomplishes the grouping of plants into categories based on degrees of similarity. All individual plants which resemble each other closely constitute a species; thus, all the Bermuda palmetto trees form the species *Sabal Blackburnianum*; many species are composed of groups of individuals resembling each other still more closely and often differing very little from each other, and these are termed races; thus, all cabbage plants form the species *Brassica oleracea*, but there are many kinds (races) of cabbage. Coherent series of species constitute genera, thus the genus *Sabal* is composed of about a dozen different kinds of palmetto.

Genera are grouped into Families, the Palm Family, for example, comprising the palmettoes and all other true palms. Families are grouped into Orders, the Order Palmales consisting of the Palm Family and the Panama-hat Plant Family. Orders are grouped into Classes, and Classes into Phyla.

Botanical Nomenclature provides names for the various categories of plants. Latin is the language accepted for international use, but most common or conspicuous plants are locally known by names in the language of the country, often a translation of the botanical name.

Species names are binomial; thus the Bermuda Palmetto is *Sabal Blackburnianum*; if races or varieties are named a trinomial is used, thus the Variegated India Rubber Fig is *Ficus clastica variegata*; in this work no attempt is made to describe races or varieties. Genus names are uninomial, *Sabal* applying to all true palmettoes. Family names are formed by adding the letters *aceae* to the root of the name of a genus, thus Brassicaceae, the Mustard Family, from *Brassica,* the genus of the mustards. Ordinal names are formed by adding the letters *ales* to the root of a generic name. Names of classes are various in formation. Names of phyla take the termination *phyta.*

Priority of publication in time or place, commencing with the "Species Plantarum" of Linnaeus published in 1753, is the general principle maintained in the application of Latin botanical names. In the case of species names, the first one published for a plant is used, even if it was regarded by the original author as belonging to a genus other than the one in which it is now included; thus, the Sea Grape, named by Linnaeus *Polygonum Uvifera,* when placed in the genus *Coccolobis,* became *Coccolobis Uvifera*; Buckwheat, termed by Linnaeus *Polygonum Fagopyrum*, when included in the genus *Fagopyrum,* becomes *Fagopyrum Fagopyrum.* It is also maintained that a name published for a species or a genus is not subsequently applicable to any other species or genus.

Names of authors (often abbreviated) following genus or species names are those of the botanists who first described the plants concerned; if the plant was first included in a different category from that now accepted, the name of the first author is enclosed in parentheses; thus, the Sea Grape, originally named *Polygonum Uvifera* by Linnaeus, was subsequently transferred to the genus *Coccolobis* by Jacquin; this is indicated by writing the name *Coccolobis Uvifera* (L.) Jacq. In the citations of certain genus names, brackets are used to indicate that the name was taken up by Linnaeus from authors preceding him; thus *Cassia* [Tourn.] L. indicates that Linnaeus adopted the name from his predecessor Tournefort.

The synonyms cited in this book are mainly names used by previous authors on the Bermuda flora, in case these are different from the names

here accepted. Specific names used by previous authors in other genera are also cited in many cases.

Botanical Terminology provides concise expression for the description of plants and of their parts. A glossary of terms will be found on pages 551–561.

I gratefully acknowledge aid and coöperation during the investigation which has made this volume possible, from Mr. Stewardson Brown, Curator of Botany in the Academy of Natural Sciences of Philadelphia, who did much of the field work and who has read the proofs; from Dr. John K. Small, Head Curator of the Museums, New York Botanical Garden, who has aided in the determination of specimens, read the proofs, and whose "Flora of the Southeastern United States" has been much used for generic and specific descriptions; from Mrs. N. L. Britton, who assisted in much of the field work and has contributed the chapter on Mosses; from Professor Alexander W. Evans, of Yale University, who has contributed the chapter on the Hepaticae; from Professor Lincoln W. Riddle, of Wellesley College, for his contribution of the chapter on Lichens; from Dr. Fred J. Seaver, Curator, New York Botanical Garden, for the chapter on Fungi; from Dr. Marshall A. Howe, Curator, New York Botanical Garden, for the chapter on Algae; from Dr. John H. Barnhart, Bibliographer, New York Botanical Garden; from Miss Delia W. Marble and Mrs. Nellie F. Flynn, for collections of specimens; from Dr. B. L. Robinson, of Harvard University, for collections made by Mr. F. S. Collins; from members of the staff of the Royal Gardens at Kew; from Mr. E. J. Wortley, Director of Agriculture of Bermuda, for information, specimens and help of all kinds during the field work and subsequently; also from his predecessor, Mr. T. J. Harris; from Mr. R. R. Swainson, in charge of the public garden at St. George's, and from the Honorable S. S. Spurling and Colonel W. B. Winter, for aid, information and advice.

The many beautiful private Bermuda gardens were hospitably thrown open to us, and our appreciation of these favors is cordially tendered to His Excellency General Sir George M. Bullock, Governor of Bermuda, for facilities for study at Mt. Langton; to Rev. Edward J. Lough, of Paget Rectory; to Mrs. W. T. James, of Bellevue; to Dr. Theodore Outerbridge, of Sunny Lands; to Mr. J. Scott Pearman, of Mount Hope; to Dr. T. H. Outerbridge, of Somerville; to the Misses Wood, of Wood Haven; to Mrs. F. Hodgson Burnett, of Clifton Heights; to Miss Emily Trimingham, of Montrose; to Major T. M. Dill, of Pembroke Hall; to the Misses Frith, of Rose Cottage; to the Messrs. Hollis, of Radnor; to Mr. F. G. Gosling, of Castle Point; to Mr. F. B. Spurling, of Echo Heights; to Mr. Cecil H. Neave, of the Chapman Estate, St. George's; to the managers of estates at Orange Valley, Rosebank, Caledonia Park, and Spanish Point, and to many others who have helped the investigation.

FLORA OF BERMUDA

All plants may be grouped in four main categories, known as Phyla or Subkingdoms, as follows:

Phylum 1. **Spermatophyta,** those which bear seeds, a seed being different from all other vegetable structures by containing an embryonic plantlet. All spermatophytes bear flowers of one kind or another, and this phylum is also called Anthophyta, or flowering plants and, to distinguish it from the three other phyla collectively, Phanerogamia. Phyla 2, 3 and 4 taken together are called Cryptogamia; all these are seedless.

Phylum 2. **Pteridophyta,** comprises ferns and fern allies; all are flowerless and have two separate and distinct alternating generations, the one represented by the fully developed plant having root, stem and leaves, with vascular tissue and bearing spores, a spore being a single vegetable cell capable of growing into a new plant; the other, called the prothallium stage, is small, inconspicuous, grows from the spores, has no vascular tissue, is not differentiated into root, stem and leaves, and bears the sexual organs; from the female organ of the prothallium (archegonium) the fully developed spore-bearing plant again arises; the male organ, borne either on the same prothallium or on a different one, is called an antheridium.

Phylum 3. **Bryophyta,** consists of mosses and their allies; all are small flowerless plants with alternating sexual and non-sexual (spore-bearing) generations, but the spore-bearing generation never becomes separated and independent; the sexual generation is commonly the more conspicuous and is, in most cases, differentiated into stem and leaves, while the spore-bearing generation is never thus differentiated; their spores are borne in conceptacles termed capsules, and from the spores the plant again develops. Bryophytes consist almost wholly of cellular or non-vascular tissue.

Phylum 4. **Thallophyta,** includes the algae, fungi and lichens; all are flowerless and their methods of reproducing and propagation are varied. They contain no vascular tissue (except a few large

algae) and the plant body is not differentiated into stem and leav
Many of them are of microscopic size.

Phylum 1. SPERMATÓPHYTA.

SEED-BEARING PLANTS.

Plants producing seeds which contain an embryo formed of one
more rudimentary leaves (cotyledons), a stem (hypocotyl, radicle
and a terminal bud (plumule), or these parts sometimes undiffere
tiated before germination. Microspores (pollen-grains) are bor
in microsporanges (anther-sacs) on the apex or side of a modifi
leaf (filament). The macrosporanges (ovules) are borne on the fa
of a flat or inrolled much modified leaf (carpel) and contain o
macrospore (embryo-sac); this develops the minute female protha
lium, an archegone of which is fertilized by means of a tube (polle
tube), a portion of the male prothallium sprouting from the polle
grain.

There are two classes which differ from each other as follows:

Ovules and seeds contained in a closed cavity (ovary); stigmas 1 or more. Class 1. ANGIOSPERMAE.
Ovules and seeds borne on the face of a scale; stigmas none. Class 2. GYMNOSPERMAE

Class I. ANGIOSPÈRMAE.

Ovules (macrosporanges) enclosed in a cavity (the ovar
formed by the infolding and uniting of the margins of a modifi
rudimentary leaf (carpel), or of several such leaves joined togeth
in which the seeds are ripened. The pollen-grains (microspores)
alighting upon the summit of the carpel (stigma) germinate, sen
ing out a pollen-tube which penetrates its tissues and reaching
ovule enters the orifice of the latter (micropyle), and its tip comi
in contact with a germ-cell in the embryo-sac, fertilization is effecte
In a few cases the pollen-tube enters the ovule at the chalaza, not
the micropyle.

Cotyledon mostly one; stem endogenous. Sub-class 1. MONOCOTYLEDONI
Cotyledons mostly two; stem (with rare exceptions) exogenous. Sub-class 2. DICOTYLEDONES.

Sub-class 1. MONOCOTYLÉDONES.

Embryo with a single cotyledon and the first leaves of t
germinating plantlet alternate. Stem composed of a ground-ma
of soft tissue (parenchyma) in which bundles of wood-cells a
irregularly imbedded; no distinction into wood, pith and bar
Leaves usually parallel-veined, mostly alternate and entire, co
monly sheathing the stem at the base and often with no distinct
of blade and petiole. Flowers often 3-merous or 6-merous.

† CARPELS 1 OR MORE, DISTINCT (united, at least partially, in Vallisneria, Zostera and others of the Naiadales, which are aquatic herbs, in Hydrocharitales and in some palms); parts of the usually imperfect flowers mostly unequal in number.

Inflorescence various, not a true spadix.
Leaves neither compound nor flabellate.
Flowers not in the axils of dry chaffy scales.
Endosperm mealy or fleshy; perianth of bristles or chaffy scales or wanting; flowers monœcious, spicate or capitate. Order 1. PANDANALES.
Endosperm none, or very little.
Perianth rudimentary, or none. Order 2. NAIADALES.
Perianth present. Order 3. HYDROCHARITALES.
Flowers in the axils of dry chaffy scales, arranged in spikes or spikelets. Order 4. POALES.
Leaves pinnately or palmately compound, or flabellate
Trees or shrubs; perianth of 2 series of 3 parts. Order 5. ARECALES.
Herbs; perianth none, or rudimentary. Order 6. CYCLANTHALES.
Inflorescence a fleshy spadix, with or without a spathe; or plants minute, floating free, the flowers few or solitary on the margin or back of the thallus. Order 7. ARALES.

†† CARPELS UNITED INTO A COMPOUND OVARY; parts of the usually complete flowers mostly in 3's or 6's.
Seeds with endosperm.
Flowers regular, or nearly so (corolla irregular in Commelina).
Endosperm mealy; ovary mostly superior. Order 8. XYRIDALES.
Endosperm fleshy or horny. Order 9. LILIALES.
Flowers very irregular; ovary inferior. Order 10. SCITAMINALES.
Seeds without endosperm, very numerous and minute; ovary inferior; flowers very irregular. Order 11. ORCHIDALES.

Order I. PANDANÀLES.

The native Bermuda species is an aquatic or marsh plant, with narrow elongated leaves and very small, imperfect and incomplete flowers in spikes. The order takes its name from the Old World tropical genus *Pandanus*, the so-called Screw-pine, species of which are commonly cultivated in gardens.

Monœcious marsh or aquatic herbs, the perianth of bristles; leaves unarmed. Fam. 1. TYPHACEAE.

Dioecious trees or shrubs; perianth none; leaves usually spinulose-margined. Fam. 2. PANDANACEAE.

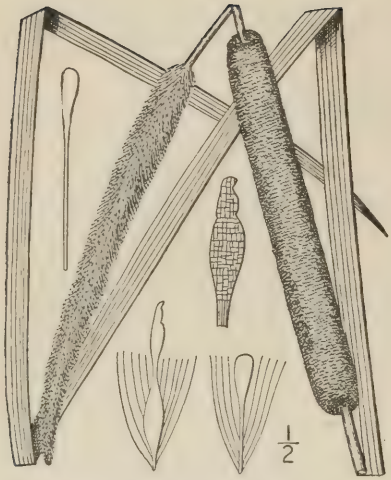
Family 1. TYPHÀCEAE J. St. Hil.

CAT-TAIL FAMILY.

Marsh or aquatic plants with creeping rootstocks, fibrous roots and glabrous erect, terete stems. Leaves linear, flat, ensiform, striate, sheathing at the base. Flowers monœcious, densely crowded in terminal spikes, which are subtended by spathaceous, usually fugacious bracts, and divided at intervals by smaller bracts, which are caducous, the staminate spikes uppermost. Perianth of bristles. Stamens 2–7, the filaments connate. Ovary 1, stipitate, 1–2-celled. Ovules anatropous. Styles as many as the cells of the ovary. Mingled among the stamens and pistils are bristly hairs, and among the pistillate flowers many sterile flowers with clavate tips. Fruit nut-like. Endosperm copious. Only the following genus

1. TÝPHA [Tourn.] L.

Characters of the family. [Name ancient.] About 10 species, widely distributed in temperate and tropical regions. Type species, *Typha latifolia* L.



1. Typha angustifòlia L. NARROW-LEAVED CAT-TAIL. SHAG. (Fig. 1.) Stems slender, 4°–10° high. Leaves 2″–6″ wide; spikes light brown, the staminate and pistillate portions usually distant, the two together sometimes 2° long, the pistillate, when mature, 4″–8″ in diameter, and provided with bractlets; stigmas linear or linear-oblong; pollen-grains simple; fruit not furrowed, not bursting in water; outer coat of the seed not separable. [*T. domingensis* (Pers.) Kunth.]

Common in marshes, often forming large patches. Native. Widely distributed in tropical and temperate regions of both the New World and the Old. Its very light seeds are freely distributed by the wind, and the plant may readily have reached Bermuda by winds, either from the West Indies, or from the American mainland. Its leaves are used for bedding domestic animals. Flowers in spring, the furry spikes maturing in autumn and the minute fruits then blown about by the wind.

Family 2. **PANDANÀCEAE** Endl.

SCREW-PINE FAMILY.

Trees or shrubs, usually with erect trunks, repeatedly branching and emitting aerial roots at least below, the spirally arranged narrow leaves clustered at the ends of the branches and usually spinulose-margined, the small, sessile, diœcious flowers in large, dense, terminal or axillary clusters. Perianth none. Staminate flowers with many stamens, the anthers oblong, erect, and a rudimentary ovary. Pistillate flowers with a single, 1-celled ovary, containing a single anatropous ovule in *Pandanus*, the stigma sessile. Fruit a syncarp, the seeds very small. There are nearly 100 species, natives of the Old World tropics, grouped in 2 genera.

Pandànus ùtilis Bory, SCREW-PINE, Madagascan, probably the largest of the genus, is commonly planted for ornament and interest and some very fine specimens may be seen. It may reach a height of 50°–60°, but Bermuda examples have reached only about half that height. It has pale green rigid leaves 3° long or less, their margins very spiny; its globose pendulous beads of fruit are 6′–8′ thick. [*P. odoratissimus* of H. B. Small and of Jones.]

Pandànus Veìtchii Lem., VEITCH'S SCREW-PINE, Polynesian, also planted for ornament, is smaller, branches rather freely from near the ground, and has thinner shiny leaves, dark green with marginal white bands, also spiny.

Pandanus muricàtus Thouars, Madagascan, recorded by Jones, is not now known to be represented in Bermuda.

Order 2. **NAIADÀLES.**

Aquatic or marsh herbs, the leaves various. Flowers perfect, monœcious or diœcious. Perianth present, or wanting Parts of the flower mostly unequal in number. Carpels 1 or more, distinct and separate or united; endosperm none, or very little.

Carpels distinct and separate. Fam. 1. ZANNICHELLIACEAE.
Carpels united, or only 1.
  Flowers borne on a 1-sided spike. Fam. 2. ZOSTERACEAE.
  Flowers axillary. Fam. 3. CYMODOCEACEAE.

Family 1. **ZANNICHELLIÀCEAE** Dumort.

PONDWEED FAMILY.

Perennial plants, the foliage mostly submerged. Leaves very narrow or filiform. Flowers monœcious or perfect, small, and inconspicuous. Perianth none. Stamens 1–4, with extrorse anthers. Carpels 1-seeded. Fruit drupe-like. Endosperm none. Four genera and sixty or more species, mostly inhabiting fresh water, but the only Bermuda representative lives in brackish pools

1. RÙPPIA L.

Slender, widely branched aquatics with capillary stems, slender alternate 1-nerved leaves tapering to an acuminate apex, and with membranous sheaths. Flowers on a capillary peduncle, naked, consisting of 2 sessile anthers, each with 2 large separate sacs attached by their backs, having between them several pistillate flowers in 2 sets on opposite sides of the rachis, the whole cluster at first enclosed in the sheathing base of the leaf. Stigmas sessile, peltate. Fruit small obliquely-pointed drupelets, several in each cluster and stipitate. [Name in honor of Heinrich Bernhard Rupp, a German botanist.] In the development of the plants the staminate flowers drop off and the peduncle elongates, bearing the pistillate flowers in 2 clusters at the end, but after fertilization it coils up and the fruit is drawn below the surface of the water. Three or four species, widely distributed in salt and brackish water, the following typical.

1. Ruppia marítima L. MARITIME RUPPIA. (Fig. 2.) Stems usually whitish, often 3° long, the internodes irregular, naked. Leaves 1′–3½′ long, ¾″ or less wide; sheaths with a short free tip; peduncles in fruit sometimes 1° long; stipes 4–6 in a cluster, ½′–1½′ long; fruits with a dark hard shell, ovoid, about 1″ long, often oblique or gibbous at the base, pointed with the long style, but varying much in shape. [*R. maritima longipes* Hagström.]



Brackish pools. Native. Nearly cosmopolitan in brackish water. It probably reached Bermuda by ocean currents. It is commonly known as Ditch-grass.

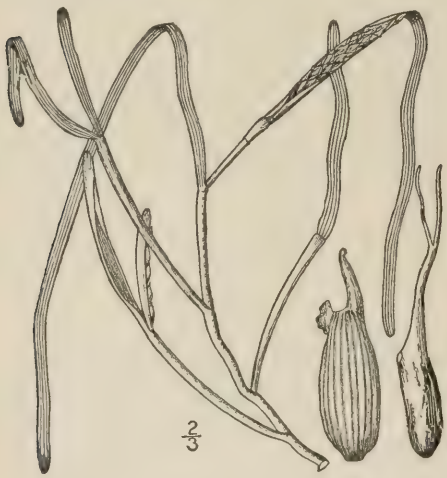
Family 2. **ZOSTERÀCEAE** Dumort.

EEL-GRASS FAMILY.

Perennial marine herbs, with long rootstocks and branching stems. Leaves alternate linear, sheathing. Flowers monœcious or diœcious, borne on a 1-sided spadix enclosed in a spathe. Staminate flowers of a sessile 1-celled anther. Pistillate flowers of 2 united carpels, a distinct style and 2 filiform stigmas. Two genera and seven or eight species, inhabiting the ocean.

1. ZOSTÈRA L.

Marine plants with slender rootstocks and compressed stems. Leaves 2-ranked, the sheaths with inflexed margins. Spadix linear. Flowers monoecious, arranged alternately in 2 rows on the spadix. Staminate flower atached to the spadix near its apex, the anther opening irregularly on the ventral side; pollen thread-like. Pistillate flower fixed on its back near the middle; ovary 1; style elongated; mature carpels flask-shaped, membranous, rupturing irregularly, beaked by the persistent style; seeds ribbed; embryo ellipsoid. [Greek, referring to the ribbon-like leaves.] About 6 species of marine distribution, the following typical.



1. Zostera marina L. EEL-GRASS. GRASS-WRACK. (Fig. 3.) Leaves ribbon-like, obtuse at the apex, 1°–6° long, about 3″ wide, with 3–7 principal nerves. Spadix 1′–4′ long; flowers crowded, usually from 10–20 of each kind on the spadix; ovary somewhat vermiform; at anthesis the stigmas are thrust through the opening of the spathe and drop off before the anthers of the same spadix open; the anthers at anthesis work themselves out of the spathe and discharge the glutinous stringy pollen into the water; seeds cylindric, strongly about 20-ribbed, about 1½″ long, truncate at both ends, the ribs showing very clearly on the pericarp.

In the ocean, washed ashore. Native. Of very wide marine distribution from Greenland to Florida, from Alaska to California and on the coasts of the Old World.

Family 3. **CYMODOCEÀCEAE** Kerner.

MANATEE-GRASS FAMILY.

Submerged marine perennial herbs with long rootstocks. Leaves narrow, sheathing. Flowers monoecious or dioecious, solitary or cymose. Staminate flowers of two long-pedicelled anthers, the anthers 2-celled, longitudinally dehiscent. Pistillate flowers of 1 or 2 carpels, the 1 or 2 stigmas filiform. Fruit nut-like, 1-seeded. Two known genera, the following, and *Halodule*.

1. **CYMODÒCEA** Konig.

Leaves terete in our species, acute. Flowers dioecious. Pistillate flowers of 2 carpels; stigmas 2. Seed pendulous. [Named for Cymodoce, one of the Nereids.] Type species: *Cymodocea aequorèa* Konig.

1. Cymodocea manatòrum Aschers. MANATEE-GRASS. (Fig. 4.) Rootstock branched, rooting at the nodes. Leaves 1½′–13′ long, terete or nearly so, about 1″ thick, their bases enclosed by membranous stipular sheaths ½′–2′ long.

The sketch of the inflorescence in the illustration is from a drawing kindly sent me by Prof. C. H. Ostenfeld, of Copenhagen. Abundant in shallow bays and coves, in water from 2° to 6° in depth, Castle Harbor. Shallow salt water, from Florida and the Bahamas to Jamaica, Martinique and Curaçao. Transported to Bermuda by ocean currents. Flowers in spring or summer. The leaves break from the plant and are washed up in large quantities on the shores. Native.



Order 3. HYDROCHARITÀLES.

Floating or more or less emersed herbs, perennial by rootstocks or stolons. Flowers monoecious or dioecious, arising from spathes. Perianth of 2 dissimilar series of parts or the corolla wanting. Stamens 3–12. Carpels 3–15, united. Ovary inferior, with several parietal placentae or several-celled. Endosperm none.

Family 1. **HYDROCHARITÀCEAE** Aschers.

FROG'S-BIT FAMILY.

Aquatic or mud-inhabiting herbs, the leaves clustered. Perianth regular, superior. Filaments distinct or partially united. Ovary usually 6–9-celled. Styles as many as the cavities of the ovary. Ovules numerous. Fruit usually indehiscent.

1. **THALÀSSIA** Banks.

Marine herbs, with elongated rootstocks. Leaves several at a joint, sheathing at the base, linear, elongated. Scape arising from the cluster of leaves. Flowers dioecious, solitary in narrow spathes of two bracts, these united into a tube at the base. Staminate flowers long-pedicelled perianth of 3 gradual sepals; stamens 6; filaments very short; anthers opening laterally. Pistillate flower nearly sessile in the spathe, caducous; ovary 6–9-celled, [illegible]

stalked, rugose or nearly echinate, opening by many valves. Seeds numerous. [Greek, referring to its growth in the ocean.] Two known species, the following typical.



1. Thalassia testùdinum Konig & Sims. TURTLE GRASS. (Fig. 5.) Submersed, glabrous. Rootstocks creeping, elongated; stems short, arising from the nodes of the rootstock; leaves 2–5, sheathing the stem; blades linear, strap-like, 6′–1° long, obtuse, withering-persistent; scapes solitary, central; fruit globose or oval, echinate-pubescent, pointed.

Common in shallow salt water. Native. Coasts of Florida and the West Indies. Doubtless transported to Bermuda by floating.

The leaves are similar to those of *Zostera*, for which the plant is often mistaken; *Zostera* apparently inhabits deeper water; we did not observe it rooted, but it doubtless occurs in place on the Bermuda banks, for quantities were seen on the north shores after a storm.

Order 4. POÀLES.

Grasses and sedges. Monocotyledonous plants, mostly herbaceous, with leafy or leafless, usually simple, stems (culms), the leaves usually narrow and elongated, entire or minutely serrulate. Flowers mostly perfect, small, incomplete, in the axils of dry, chaffy scales (glumes) arranged in spikes or spikelets.

Fruit a caryopsis (grain); culm mostly hollow. Fam. 1. POACEAE.
Fruit an achene; culm solid. Fam. 2. CYPERACEAE.

Family 1. POÀCEAE R. Br.

GRASS FAMILY.

Annual or perennial herbs, of various habit, rarely shrubs or trees. Culms (stems) generally hollow, but occasionally solid, the nodes closed. Leaves sheathing, the sheaths usually open to the base on the side opposite the blade; a scarious or cartilaginous ring, naked or hairy, rarely wanting, called the ligule, is borne at the orifice of the sheath. Inflorescence spicate, racemose or paniculate, consisting of spikelets composed of two to many, 2-ranked imbricated bracts, called scales (glumes), the two lowest in the complete spikelet always empty, one or both of these sometimes wanting. One or more of the upper scales, except sometimes the terminal ones, contains in the axil a flower, which is usually enclosed by a bract-like awnless organ called the palet, placed opposite the scale and with its back toward the axis (rachilla) of the spikelet, generally 2-keeled; sometimes the palet is present without the flower, and vice versa. Flowers perfect or staminate, sometimes monoecious or dioecious, subtended by 1–3 minute hyaline scales called the lodicules. Stamens 1–6, usually 3.

Anthers 2-celled, versatile. Ovary 1-celled, 1-ovuled. Styles 1–3, commonly 2 and lateral. Stigmas hairy or plumose. Fruit a seed-like grain (caryopsis). Endosperm starchy. About 3500 species widely distributed throughout the world, growing in water and on all kinds of soil. Those yielding food-grains are called cereals. The species are more numerous in tropical countries, while the number of individuals is much greater in temperate regions, often forming extended areas of turf.

A. Spikelets articulated below the lowest (empty) scales, 1-flowered or 2-flowered
  a. First scale of the spikelet the longest, enclosing the others. (ANDROPOGONEAE.)
    Inflorescence of clustered racemes. 1. *Andropogon.*
    Inflorescence paniculate, decompound. 2. *Holcus.*
  b. First scale smaller than the others, or wanting. (PANICEAE.)
    1. Spikelets not sunken in the rachis of a spike.
      * Spikelets naked, not subtended by bristles or by an involucre.
        † Outer scales of the spikelets awnless.
          Spikelets obtuse, in spike-like racemes. 3. *Paspalum.*
          Spikelets acute, in spike-like racemes, or panicled.
            Second scale not saccate. 4. *Panicum.*
            Second scale saccate at base, large, many-nerved.
              Spikelets long-silky; fruiting scale lanceolate. 5. *Valota.*
              Spikelets short-pubescent or glabrous; fruiting scale elliptic. 6. *Synthérisma.*
        †† Outer scales of the spikelets awned.
          Third scale with the longest awn. 7. *Echinochloa.*
          Third scale with the shortest awn. 8. *Oplismenus.*
      ** Spikelets subtended by 1 or more bristles or by an involucre.
        Spikelets subtended by persistent bristles. 9. *Chaetochloa.*
        Spikelets subtended by a 2-valved spiny involucre, deciduous with it. 10. *Cenchrus.*
    2. Spikelets sunken in the thick rachis of a flat spike. 11. *Stenotaphrum.*

B. Spikelets articulated above the empty scales or between the flowering scales, 1-many-flowered.
  a. Spikelets paniced or racemed, or if spicate, not in depressions of the rachis of the spike.
    1. Spikelets not in 2-rowed secund spikes.
      * Spikelets 1-flowered.
        † Empty scales 4. (PHALARIDEAE.) 12. *Phalaris.*
        †† Empty scales 2. (AGROSTIDEAE.)
          Empty scales of the spikelet persistent, the flowering scales deciduous.
            Empty scales awned. 13. *Phleum.*
            Empty scales awnless. 14. *Sporobolus.*
          Spikelets wholly deciduous at maturity. 15. *Polypogon.*
      ** Spikelets 2-many-flowered.
        Flowering scales shorter than the empty ones, the awn dorsal, usually bent. (AVENEAE.) 16. *Avena.*
        Flowering scales mostly longer than the empty ones, the awn, if present, straight, terminal. (FESTUCEAE.)
          Flowering scales long-hairy; very tall grass. 17. *Arundo.*
          Flowering scales not long-hairy; low grasses.
            Flowering scales 1–3-nerved.
              Panicle-branches distichous. 18. *Koeleria.*
              Panicle-branches spirally arranged 19. *Cynosurus.*
            Flowering scales 5–many-nerved.
              Flowering scales cordate 20. *Briza.*
              Flowering scales not cordate
                Stigmas borne at or near the apex of the ovary.
                  Flowering scales keeled on the back. 21. *Poa.*
                  Flowering scales rounded on the back, at least [illegible]
                    Inflorescence a short-branched panicle. [illegible]
                    Inflorescence a simple or branched spike [illegible]

Stigmas borne below the apex of the ovary. 24. *Bromus.*
2. Spikelets in 2-rowed secund spikes. (CHLORIDEAE.)
Spikelets wholly deciduous. 25. *Spartina.*
At least the empty scales of the spikelets persistent.
Spikelets with only one perfect flower.
No scales above the flowering one. 26. *Capriola.*
One or two empty scales above the flowering one. 27. *Eustachys.*
Spikelets with 2 or 3 perfect flowers.
Spikes whorled, or close together; spikelets imbricated. 28. *Eleusine.*
Spikes distant; spikelets alternate. 29. *Leptochloa.*
b. Spikelets in 2-rowed spikes, in depressions of the rachis. (HORDEAE.)
Spikelets solitary at the nodes of the rachis. 30. *Lolium.*
Spikelets 2-6 at each node of the rachis.
Spikelets 1-flowered. 31. *Hordeum.*
Spikelets 2-several-flowered. 32. *Elymus.*

1. ANDROPÒGON L.

Perennial grasses with usually long narrow leaves, and terminal and axillary racemes. Spikelets in pairs at each node of the jointed hairy rachis, one sessile and perfect, the other with a pedicel and either staminate, empty or reduced to a single scale. Perfect spikelet consisting of 4 scales, the outer 2 coriaceous, the second keeled and acute, the two inner hyaline, the fourth more or less awned and subtending a palet and perfect flower. Stamens 1–3. Grain free. [Greek, in allusion to the bearded rachis.] About 150 species, widely distributed in tropical and temperate regions. Type species: *Andropogon hirtum* L.



1. Andropogon virgínicus L. VIRGINIA BEARD-GRASS. (Fig. 6.) Culms tufted, 1½°–3° tall, many times longer than the basal leaves; sheaths, at least the lower ones, more or less tuberculate-hirsute on the margins; leaves 16′ long or less, more or less hirsute on the upper surface near the base; spathes 1′–2′ long, broad; racemes generally in pairs about 1′ long; sessile spikelets 1½″–2″ long, the awn 5″–8″ long; pedicellate spikelet wanting or rarely present as a minute scale.

Paget Marsh, abundant in 1905 and 1913. Native. Eastern United States. Flowers in late summer and autumn. The light, hairy inflorescence may readily have been transported by hurricane winds.

Andropogon Schoenánthus L., LEMON GRASS, a grass with fragrant leaves, is cultivated, and is reported as at times spontaneous after cultivation; it is native of Old World tropics.

2. HÓLCUS L.

Tall grasses, with usually broad flat leaf-blades and large terminal panicles, their primary branches verticillate. Spikelets of 4 scales, in pairs, or in 3's

at the end of the branches, one sessile and perfect, the rest pedicellate and staminate, dorsally compressed, pubescent or glabrous. Sessile spikelets with the outer 2 scales indurated, the third and fourth hyaline, the latter awned or awnless. Pedicellate spikelets with the outer 2 scales firm membranous, or rarely reduced to 1 or 2 scales and sterile. Lodicules ciliate. Stamens 3. Styles distinct. Stigmas plumose. [Greek, taken from Pliny.] About 10 species of wide distribution. Type species: *Holcus Sorghum* L.

1. Holcus halepènsis L. JOHNSON GRASS. (Fig. 7.) Smooth and glabrous. Culms up to 6° tall, from a long rootstock; leaf-blades 2° long or less, ¼′–1½′ wide; panicle often 2° long, oblong to oval, its branches ascending, the longer ones up to 6′ long; sessile spikelet about 2″ long, ovate, the outer scales densely appressed-pubescent with silky hairs and indurated at maturity, the first scale 3-toothed at the apex, the readily deciduous awn of the fourth scale about ½′ long, geniculate, spiral below, the column much exserted; pedicellate spikelet about 3″ long, lanceolate, the 2 outer scales sparingly pubescent. [*Sorghum halepènse* Pers.]

Spontaneous after cultivation, and occasional in waste grounds. Native of southern Europe and Asia. Introduced by cultivation into the United States and West Indies. Flowers in summer.



Holcus Sòrghum L., GUINEA CORN, is occasionally grown for fodder, and has been observed in waste grounds. It is a tall grass, sometimes 12° high, with leaves 1′–2′ wide and large, often dense panicles, its grain a valuable food. [*Sorghum saccharatum* Moench; *S. vulgare* Pers.]

3. PÁSPALUM L.

Perennial grasses, various in habit, with generally flat leaves and 1 flowered spikelets, borne singly or in pairs in 2 rows on 1-sided spike-like racemes, which are single, in pairs or panicled. Spikelets oblong to orbicular, flat on the outer surface, convex on the inner. Scales 3, the outer ones membranous, the inner one indurated and subtending a palet and perfect flower. Stamens 3. Styles separate. Stigmas plumose. Grain ovoid or oblong, free. [An ancient Greek name for some grass, used by Hippocrates.] About 160 species, of wide distribution in tropical and temperate regions, most abundant in America. Type species: *Panicum dissectum* L.

Racemes several or solitary.
  Spikelets glabrous. 1 *P. ciliatifolium*
  Spikelets pubescent
    Spikelets about 1″ long, finely pubescent.
      Leaves, ¼″–3″ wide, glabrous. 2 *P.*
      Leaves 3″–6″ wide, ciliate 3 *P.*
    Spikelets nearly 2″ long, long hairy 4 *P. dilatatum*

Racemes a pair at the top of the culm.
Spikelets flat on both sides, long-ciliate. **5. *P. conjugatum.***
Spikelets plano-convex, not ciliate.
Spikelets ovate, the convex side appressed-pubescent. **6. *P. distichum.***
Spikelets ovate-lanceolate, glabrous. **7. *P. vaginatum.***



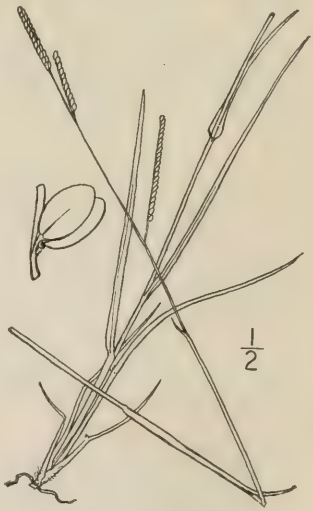
1. Paspalum ciliatifòlium Michx. CILIATE-LEAVED PASPALUM. (Fig. 8.) Culms tufted, erect, 1°–2½° tall, smooth and glabrous; leaf-sheaths ciliate on the overlapping margin, otherwise glabrous; blades 2′–10′ long, 3″–8″ wide, smooth and glabrous on both surfaces, the margins conspicuously ciliate with long hairs; racemes single, or sometimes in 2's, 2′–4½′ long; spikelets in pairs, about 1″ long, glabrous, oval to broadly obovate, the 2 outer scales 3-nerved or the second one rarely 2-nerved by the suppression of the midnerve, both glabrous. [*Paspalum setaceum* of Reade and Lefroy.]

Common on dry hillsides. Native. Southeastern United States. The seeds were probably transported to Bermuda by birds. Flowers in summer and autumn.

The Bermuda plant is referred by Hitchcock and Chase to *Paspalum propinquum* Nash, not here regarded as a distinct species.

2. Paspalum caespitòsum Fluegge. SLENDER PASPALUM. (Fig. 9.) Tufted; culms slender, 1°–2° high. Leaves glabrous, narrowly linear, flat, 2′–8′ long, 1½″–3½″ wide, erect or nearly so, with glabrous sheaths; racemes 2–6, erect, ½′–2′ long, the rachis very narrow; spikelets in pairs, a little less than 1″ long and nearly ½″ wide, elliptic, the first scale wanting, the second and third sparingly papillose-pubescent with appressed hairs, 3-nerved, the fruiting scale yellowish-white.

Rocky cliffs and on Hall's Island, Harrington Sound, and on hillsides, west side of Castle Harbor, 1912. Native. Florida and West Indies. This may be the grass recorded by Reade, Lefroy and Hemsley as *Paspalum filiforme* Sw., no Bermuda specimen of which could be found in the Kew Herbarium. Flowers in summer and autumn.



3. Paspalum Chàpmani Nash. CHAPMAN'S PASPALUM. (Fig. 10.) Tufted; culms glabrous, slender, 1½°–3° tall. Leaves 8′ long or less, 2½″–7″ wide, ciliate, the sheaths of the lower ones pubescent, those of the upper glabrous, or pubescent on the margins; racemes 3′–5′ long, usually two on the main stem and one on the branches; spikelets in pairs, oval, about 1″ long, on short pubescent stalks; first scale wanting; second and third scales densely pubescent with gland-tipped hairs; fruiting scale yellowish-white.

Hillsides between Harrington Sound and Castle Harbor. Native. West Indies and southeastern United States. Both this and the preceding species are apparently indigenous grasses; they are locally abundant in the areas indicated. Flowers in summer and autumn.





4. Paspalum dilatàtum Poir. BROAD-SCALED PASPALUM. (Fig. 11.) Perennial by rootstocks, 2°–5° long, the culms and leaves glabrous. Leaves flat, 4′–12′ long, 6″ wide or less; spike-like racemes 3–8, 1½′–3′ long; spikelets crowded, in 2 rows, but appearing as if in 4 rows, about 1½″ long, and 1″ wide, ovate-orbicular, acute, the first scale wanting, the second scale ciliate with long soft hairs, the third scale ciliolate, the fruiting scale orbicular.

Marsh, Shelly Bay, 1913; in the Intermediate Agricultural Station, Paget, June, 1914. Introduced. Native of continental America. Flowers in summer and autumn. I suppose from the manner of occurrence that this is an introduced grass, and it may have been introduced recently. It has not previously been recorded from Bermuda, and was probably here mistaken for another species.

None of the *Paspalum* species occurring in Bermuda are of any considerable value as forage grasses.

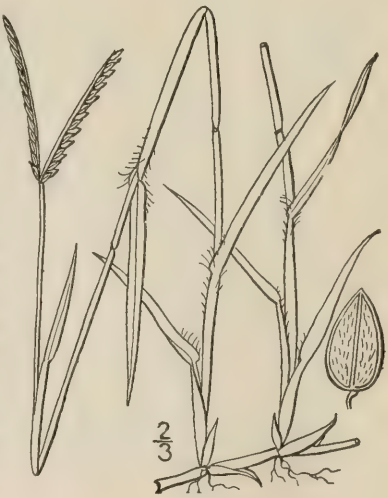


5. Paspalum conjugàtum Berg. TWO-SPIKED PASPALUM. (Fig. 12.) Smooth and glabrous. Culms compressed, 3° high or less, finally decumbent at the base and rooting at the lower nodes; leaves 2′–5′ long, 2″–6″ wide: racemes in pairs, slender, often curved, spreading or ascending, 1½′–6′ long, the rachis straight, or flexuous toward the apex: spikelets crowded, much compressed dorsally, singly disposed, about ¾″ long, apiculate, the 2 outer scales 2-nerved, the nerves marginal, the first scale ciliate on the margins with very long lax hairs, the third scale smooth, white.

Lawns, fields and cultivated soil. Naturalized. Native of the southern United States, West Indies and tropical continental America. Flowers in summer and autumn. I regard this grass as a naturalized rather than a native species, on account of its manner of occurrence in Bermuda. It may be said, however, that in Porto Rico, and elsewhere in the West Indies, where there can be no doubt that it is indigenous. It occurs in cultivated places as well as in wild situations.

6. Paspalum dístichum L. JOINT-GRASS. (Fig. 13.) Culms 2°–4° tall, from a long stout rootstock; leaf-sheaths compressed, keeled, usually crowded and overlapping, especially at the base and on the innovations, glabrous, or more or less hairy on the margins; blades commonly less than 4′ long, 1½″–3″ wide, generally glabrous; racemes terminal, in pairs, ascending, ¾′–2′ long; spikelets singly disposed, ovate, 1″–1½″ long, acute, the 2 outer scales firm, 5-nerved, rarely 7-nerved, the first scale glabrous, the second appressed-pubescent, the third apiculate, pubescent at the apex.

Frequent in marshes and waste grounds. Native. Southern United States, West Indies and tropical continental America. Its seeds probably transported by birds. Flowers in summer and autumn.



7. Paspalum vaginàtum Sw. SHEATHED PASPALUM. (Fig. 14.) Culms 8′–2° tall, from a long stout rootstock; leaf-sheaths compressed, keeled, usually crowded and overlapping, at least at the base and on the innovations, glabrous; blades folded, or involute when dry, 6′ long or less, 1″–2″ wide, glabrous, or sparingly hairy; racemes terminal, usually a pair, rarely more or but a single one, erect or ascending, 2′–3′ long: spikelets singly disposed, ovate-lanceolate, acute, 1½″–2″ long, the 2 outer scales glabrous, thin, the first scale 4-nerved, the lateral nerves approximate at the margin, the midnerve suppressed, the second scale 5-nerved, the lateral nerves rather near together, the third scale glabrous at the apex or with 2 or 3 hairs.



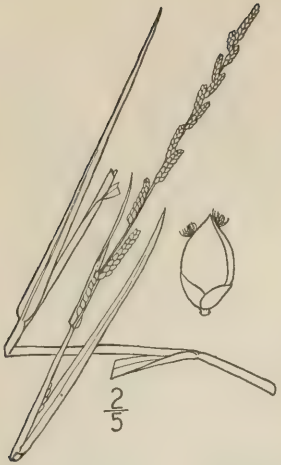
Frequent in brackish marshes. Native. Southern United States and West Indies. Its seeds probably transported by birds. Flowers in summer and autumn.

Paspalum filiformè Sw., a West Indian grass recorded as Bermudian by Jones, Reade and by Lefroy, as wire-grass, and admitted by Hemsley, has not been found by recent collectors. (See *P. caespitosum.*)

4. PÁNICUM L.

Annuals or perennials, various in habit, with open or contracted panicles or 1-sided spike-like racemes. Spikelets 1–2-flowered, when 2-flowered the lower one staminate only. Scales 4, the 3 lower membranous, empty, or the third with a staminate flower, varying in the same species; the inner or fourth scale chartaceous, shining, enclosing a palet of similar texture and a perfect flower. Awns none. Stamens 3. Styles distinct. Stigmas plumose. Grain free, enclosed in the hardened fruiting scale and palet. [Old Latin name for some grass, probably the cultivated Sorghum, referring to its panicle, taken from Pliny.] About 500 species, in temperate and tropical regions. Type species: *Panicum miliaceum* L.

Spikelets in pairs in one-sided spike-like racemes.
  Glabrous. 1. *P. germinatum.*
  Pubescent, at least at the nodes. 2. *P.* [illegible]
Spikelets panicled.
  Fourth scale of the spikelet smooth.
    Annual grasses.
      Leaf sheaths pubescent. 3. *P.* [illegible]
      Leaf sheaths glabrous. 4. *P.* [illegible]
    Tall perennial grass 5. *P.* [illegible]
  Fourth scale transversely rugose; tall grass 6. *P.* [illegible]



1. Panicum geminàtum Forsk. WATER GRASS. (Fig. 15.) Aquatic. Culms 2°–4° long, usually clothed with sheaths below; leaves glabrous, 10′ long or less, 3″–5″ wide; racemes 10–20, one-sided, the rachis broadly winged, appressed, ¾′–1½′ long; spikelets about 1¼″ long, ovate, acute, glabrous, singly disposed in 2 rows, the first scale broader than long and clasping the spikelet at its base, truncate at the apex, the fourth scale transversely wrinkled. [*P. paspaloides* Pers.]

Bermuda, collected only by Moseley. Native. In shallow water, southern United States; tropical regions of the New World and the Old. Flowers from spring to autumn. Seeds presumably transported by birds.

2. Panicum barbinòde Trin. PARA GRASS. (Fig. 16.) Sterile culms 3°–6° long, rooting at the nodes, the fertile ones erect, 2°–3° tall or more, the nodes densely barbed; leaf-sheaths often overlapping, papillose-hirsute; blades 4′–12′ long, glabrous or pubescent, 3″–8″ wide; panicle 6′–8′ long, its branches spreading or ascending; spikelets about 1½″ long, glabrous.

Abundant in marshes. Naturalized from tropical America. Naturalized also in the southern United States. A very valuable fodder-grass, often erroneously called *Panicum mollе*, as by Jones.





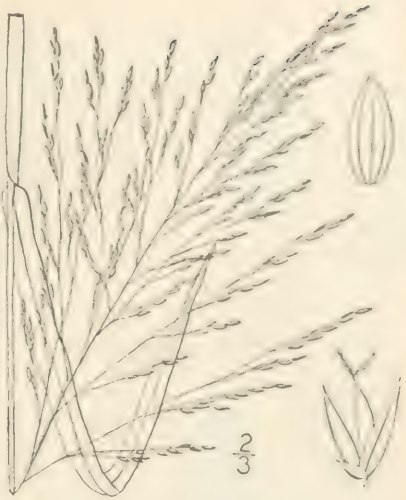
3. Panicum capillàre L. WITCH GRASS. QUAKING GRASS. (Fig. 17.) Culms 1°–2° tall, simple, or branched near the base, stout; leaf-sheaths usually purplish, papillose-hirsute; blades 3″–8″ wide, pubescent; primary panicle 8′–1° long, the larger branches 6′–9′ long, the lateral panicles smaller; spikelets very numerous, about 1″ long, lanceolate, acuminate, glabrous.

Waste grounds and cultivated soil. Naturalized. Eastern temperate North America. Its light panicles are widely transported by winds. Flowers in summer and autumn. Regarded as native by Lefroy, but its habitat makes this improbable. [*P. brevifolium* of Rein.]

4. Panicum dichotomiflòrum Michx. CANE GRASS. (Fig. 18.) Culms at first erect, 1°–2° tall, simple, later decumbent and longer, branched at all the upper nodes. Leaf-sheaths loose, glabrous, somewhat flattened; blades 6′–2° long, long-acuminate; panicle pyramidal; spikelets 1″–1½″ long, lanceolate, acute, glabrous. [*P. proliferum* of Reade and of Millspaugh.]

Roadsides and wet soil. Naturalized. Eastern United States. Flowers in summer and autumn. Branches of its panicles are transported by winds.





5. Panicum virgàtum L. SWITCH GRASS. (Fig. 19.) Culms erect from a stout rootstock, 3°–6° tall; leaf-blades elongated, 1° long or more, 3″–6″ wide, flat, glabrous or pubescent: panicle ½°–1½° long, its branches widely spreading or sometimes nearly erect; spikelets ovate, acuminate, about 2″ long, glabrous.

Coastal rocks and borders of marshes. Native. Eastern North America and Cuba. Seeds transported by birds or by the wind. Flowers in summer or autumn. The Bermuda plant is referred by Hitchcock to *P. virgatum cubense* Griseb.

6. Panicum máximum Jacq. GUINEA GRASS. (Fig. 20.) Culm 2°–6° tall or more, leafy; leaf-sheaths overlapping, glabrous, or tuberculate-pubescent; blades elongated, ½′–1½′ wide, glabrous; panicle 1°–2° long, its branches erect or nearly so, very long; spikelets glabrous, 1½″–2″ long, the fourth scale transversely rugose.

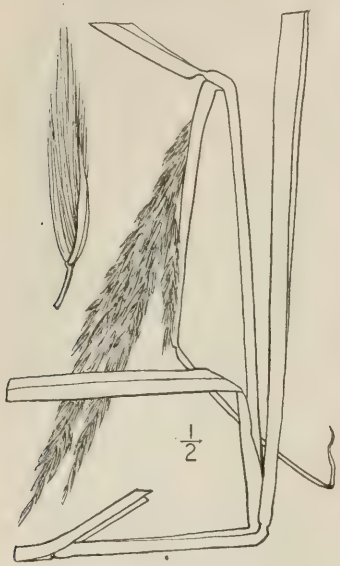
Waste grounds and cultivated soil. Naturalized. Native of tropical America. Naturalized also in the southern United States. A valuable fodder grass.



Panicum palmifòlium Poir., PALM-LEAVED PANICUM, a tall grass with strongly, plicately nerved leaves often 1° long and 1′ wide, more or less pubescent with long hairs, the spikelets in a narrow panicle, is sometimes planted for ornament. It is native of Tropical America and naturalized in Jamaica.

5. **VALÒTA** Adans.

Tall perennial grasses, with flat leaves and large terminal pubescent panicles. Spikelets lanceolate, acute or acuminate; scales 4, the 3 outer ones membranous, empty, the first minute or rudimentary, the second silky-pilose and ciliate, the fourth one shorter, glabrous, shining, chartaceous. [Perhaps in honor of P. Vallot.] Several species of warm temperate and tropical America, the following typical. The genus has formerly been included in *Panicum* by authors, but present knowledge of grasses justifies its separation, returning to the view of Adanson.



1. Valota insulàris (L.) Chase. SILKY GRASS. (Fig. 21.) Culms erect, slender, 3°–5° high, clustered. Leaves 1° long or less, 5″–10″ wide, acuminate, glabrous, or their sheaths pubescent; panicle narrow, often 1° long, little, if any more than 1′ thick; spikelets 2″–3″ long, acuminate; second and third scale 3-nerved, long-hairy; fruiting scale chestnut-brown. [*Andropogon insulare* L.; *Trichachne insularis* Nees.]

Wooded bluff, Abbot's Cliff, Harrington Sound, 1912. Native. Florida and West Indies. Perhaps of recent introduction. Flowers nearly throughout the year. This conspicuous grass has not hitherto been recorded from Bermuda, although seen in large quantities at the locality noted.

Sacciolepis striàta (L.) Nash of the southeastern United States and Cuba, an aquatic perennial grass up to 6° high with spikelets in a narrow panicle, was described by Sprengel in 1825 as from Bermuda under the name *Panicum aquaticum* Bosc, but nothing further has been known about it here since that time.

6. **SYNTHERÍSMA** Walt.

Annual grasses, with flat leaf-blades and an inflorescence of spike-like racemes which are disposed in whorls, or scattered and approximate, at the summit. Spikelets narrow, acute, in 2's or 3's on one side of the flat and winged or triangular rachis, one of the spikelets generally longer-pedicelled than the others. Scales 3 or 4, the 3 outer membranous, the first small or wanting, the fourth chartaceous, glabrous and shining, at length indurated, enclosing a palet of similar texture and a perfect flower. Stamens 3. Styles distinct. Stigmas plumose. [Greek, crop-making, referring to its abundance.] About 25 species, of temperate and tropical regions. Type species: *Syntherisma praecox* Wald. [*Digitaria* Scop., not Heist.]

First scale minute; fruiting scale greenish or yellowish.
  Rachis nearly ½″ wide; spikelets 1½″ long. 1. *S. sanguinalis.*
  Rachis ¼″ wide; spikelets about 1″ long. 2. *S. digitata.*
First scale wanting; fruiting scale deep brown. 3. *S. longiflora.*

1. Syntherisma sanguinàlis (L.) Dulac. COMMON CRAB-GRASS. (Fig. 22.) Culms 2½° long or less, finally branched, prostrate at the base and rooting at the lower nodes. Lower leaf-sheaths densely papillose-hirsute; blades 2″–5″ wide, erect or ascending, glabrous or more or less pubescent: racemes 2–9, 1′–5′ long, erect or ascending, alternate, in pairs or whorls; spikelets about 1½″ long, lanceolate, very acute, in pairs; first scale small, glabrous, the second and third appressed-pubescent with long hairs, the second one 3-nerved, the third slightly exceeding the flowering scale, 7-nerved, the pubescence usually becoming widely spreading, the fourth one lanceolate, very acute, yellowish-white at maturity. [*Panicum lineare* of Lefroy; *Panicum sanguinale* L.; *Digitaria marginata* Link; *Syntherisma marginatum* Nash.]



Common in waste and cultivated grounds, often a pernicious weed. Naturalized. Southern United States; Bahamas; tropical South America. The characters relied upon by authors to separate *S. marginatum* from *S. sanguinale* do not appear to be specific.



2. Syntherisma digitàta (Sw.) Hitchc. NARROW CRAB-GRASS. (Fig. 23.) Culms 1½°–3° long, branched, tufted, at length decumbent below and rooting at the lower nodes. Leaves more or less densely hirsute, 1′–5′ long, 1″–3½″ wide; racemes several, 1½′–5½′ long, whorled or alternate or approximate in pairs, widely spreading; rachis very narrow, spikelets in pairs, about 1″ long, lanceolate, acuminate; first scale minute, glabrous; second scale 3-nerved, appressed-pubescent; third scale 7-nerved, also appressed-pubescent; fruiting scale nearly 1″ long, shorter than the third, elliptic, greenish when mature. [*Milium digitatum* Sw.; *Digitaria* [illegible] Roth; *Panicum barbinode* Mayer.]

Bermuda [illegible] United States [illegible] tropical [illegible]



3. **Syntherisma longiflòra** (Retz.) Skeels. SLENDER CRAB-GRASS. (Fig. 24.) Culms slender, 1½° long or less, erect or reclining, glabrous. Leaves linear, long-acuminate, glabrous, 6′–12′ long, 2″–3″ wide; racemes in a terminal whorl of 3–5, or rarely fewer, sometimes 1 or 2 additional ones below, 4′ long or less; rachis winged; pedicels hispidulous; spikelets in 2's or 3's, about ¾″ long, white, elliptic, acute; first scale wanting; second and third scales about equal, 3–5-nerved, appressed-pubescent; fruiting scale brown, acute. [*Paspalum longiflorum* Retz.; *Digitaria longiflora* Pers.]

Abundant on hillsides about Hamilton. Naturalized. Native of Jamaica, Trinidad and tropical continental America. Flowers in summer and autumn.

7. ECHINÓCHLOA Beauv.

Usually tall grasses, commonly annuals, with broad leaves and a terminal inflorescence consisting of one-sided racemes, racemosely or paniculately arranged. Spikelets 1-flowered, singly disposed, or in smaller racemes or clusters on the ultimate divisions of the inflorescence. Scales 4, the outer 3 membranous, hispid on the nerves, the third and usually also the second scale awned, or sometimes merely awn-pointed, the awn often very long; fourth scale indurated, shining, frequently pointed, enclosing a palet of similar texture and a perfect flower. Stamens 3. Styles distinct. Stigmas plumose. Grain free. [Greek, in reference to the stout hispid hairs of the spikelets.] Species about 12, mostly in warm and tropical countries. Type species: *Panicum Crus-galli* L.

Spikelets 3 mm. long, the second and third scales awned. 1. *E. Crus-galli.*
Spikelets 2 mm. long; second and third scales merely awn-pointed. 2. *E. colonum.*

1. **Echinochloa Crús-gálli** (L.) Beauv. BARNYARD-GRASS. COCKSPUR-GRASS. (Fig. 25.) Culms 1°–4° tall, often branching at base. Sheaths smooth and glabrous; leaves 6′–2° long, glabrous: panicle composed of 5–15 sessile branches; spikelets ovate, green or purple, densely crowded in 2–4 rows on one side of the rachis; second and third scales about 1½″ long, scabrous or hispid, the third scale more or less awned, empty, the fourth ovate, abruptly pointed.

Waste grounds, Pembroke Marsh, 1905, apparently recently introduced as it is not recorded by the older authors; abundant in Devonshire Marsh, 1914. In cultivated and waste places, throughout North America except the extreme north. Widely distributed as a weed in all cultivated regions. Naturalized from Europe. Flowers in summer and autumn. [*Panicum Crus-galli* L.]



2. Echinochloa colònum (L.) Link. JUNGLE RICE. (Fig. 26.) Culms tufted smooth and glabrous, 6′–2° tall, often decumbent and rooting at the lower nodes. Sheaths compressed, usually crowded; leaves flat, 1′–8′ long; inflorescence composed of 3–18, 1-sided more or less spreading, dense racemes, disposed along a 3-angled rachis; spikelets single, in pairs, or in 3's in 2 rows on one side of the hispidulous, triangular rachis, obovate, pointed, the first scale about one half as long as the spikelet, 3-nerved, the second and third scales a little more than 1″ long, awnless, 5-nerved, hispid on the nerves, the fourth scale cuspidate. [*Panicum colonum* L.]

Frequent in waste grounds. Naturalized. Southeastern United States; tropical regions of both the New World and the Old. Flowers from spring until autumn.



8. **OPLÍSMENUS** Beauv.

Perennial grasses, often decumbent and branched at the base, with broad flat leaf-blades and inflorescence composed of spikes, bearing on the lower side scattered clusters of a few spikelets. Spikelets 1-flowered. Scales 4, the 3 outer membranous, the first and second empty, awned, the first equalling or somewhat shorter than the spikelet, the third scale usually awned, empty, or enclosing a small palet, the fourth one shorter than the others, obtuse, awnless, chartaceous, finally indurated, enclosing a shorter palet of similar texture and a perfect flower. Stamens 3. Styles distinct to the base. Stigmas plumose. [Greek, armed, presumably referring to the awns.] About 4 species, natives of warm regions. Type species: *Oplismenus africanus* Beauv.



1. Oplismenus hirtéllus (L.) R. & S. Wood Grass. [Fig. 27.] Culms prostrate or nearly so, rooting at the nodes, very slender, 2° long or less. Leaves ovate to ovate-lanceolate, acuminate, ½′–2½′ long, ½″ wide or less, their sheaths often pubescent; panicle 3½′ long or less, its filiform short branches erect or spreading; spikelets 1½″ long, the awns up to ½″ long. [*Panicum hirtellum* L.; *P. Oplismenus* of Lejeune; *Oplismenus undulatifolius* of Moore; *O. setarius* R. & S.]

Frequent on [illegible] and in wooded [illegible]. Native [illegible] United States and tropical America. Flowers in summer and autumn. [Its seeds transported to Europe.]

Oplismenus Búrmannii Pal., Variegated Oplismenus, [illegible] planted for ornament in garden borders, has lanceolate leaves [illegible] with white and pink.

9. **CHAETÓCHLOA** Scribn. (*Setaria* Beauv. 1812. Not Ach. 1798.)

Mostly annual grasses with erect culms and flat leaves, the inflorescence in spike-like clusters. Spikelets 1-flowered, or rarely with a second staminate flower, the basal bristles single or in clusters below the articulation of the rachilla, and therefore persistent. Scales of the spikelet 4, the three outer membranous, the third often subtending a palet and rarely a staminate flower; the inner or fourth scale chartaceous, subtending a palet of similar texture and a perfect flower. Stamens 3. Styles distinct, elongated. Stigmas plumose. Grain free, enclosed in the scales. [Greek, in reference to the bristles of the inflorescence.] Species about 35 in temperate and tropical regions. Type species: *Setaria longiseta* Beauv.

Annuals.
Bristles downwardly barbed. 1. *C. verticillata.*
Bristles upwardly barbed. 2. *C. viridis.*
Perennial; bristles upwardly barbed. 3. *C. geniculata.*



1. Chaetochloa verticillàta (L.) Scribn. FOX-TAIL GRASS. (Fig. 28.) Culms erect or decumbent, 1°–3° tall. Sheaths glabrous; leaves 2′–8′ long, scabrous above; spikes 2′–3′ long, green or purple, 6″–8″ thick; spikelets about 1″ long, equalled or exceeded by the downwardly barbed bristles; bristles 1–3 at the base of each spikelet, not involucrate; first scale less than one half as long as the spikelet, 1-nerved; second and third scales 5–7-nerved, equalling the oval fourth one. [*Setaria verticillata* Beauv.]

Common as a weed in waste and cultivated grounds. Naturalized. Native of the Old World. Naturalized in the southern United States and in tropical America. Flowers nearly throughout the year.



2. **Chaetochloa viridis** (L.) Scribn. GREEN FOX-TAIL GRASS. (Fig. 29.) Annual, culms 1°–3° tall. Sheaths glabrous; leaves 3′–10′ long, 2″–6″ wide; spikes 1′–4′ long; spikelets about 1′ long, elliptic, much shorter than the green, or sometimes yellowish, bristles; first scale less than one half as long as the spikelet, 1–3-nerved; second and third scales 5-nerved; fourth scale equalling or slightly exceeding the second. [*Setaria viridis* Beauv.[

Common as a weed in waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized in North America. Flowers from spring until autumn.

Chaetochloa mágna (Griseb.) Scribn., a very large West Indian species, was, apparently, collected in Bermuda by Munro in 1864, but is not known to grow here now.

3. Chaetochloa geniculàta (Lam.) Millsp. & Chase. PERENNIAL FOX-TAIL GRASS. (Fig. 30.) Perennial, by rootstocks; culms tufted, 1°–2½° tall, slender, compressed, rough below the raceme: leaf-sheaths glabrous, compressed; blades 4′–12′ long, 1½″–4″ wide, the upper surface often with a few long hairs at the base: racemes dense, spike-like, 1′–2′ long, nearly 5″ in diameter, exclusive of the bristles, the rachis pubescent: bristles 3″–5″ long: spikelets ovoid, acute, the flowering scale acute, striate, finely transversely rugose. [*Panicum geniculatum* Lam.; *Setaria glauca* of Reade, Lefroy and Hemsley.]



Common as a weed in waste and cultivated grounds. Naturalized. Native of the eastern United States and tropical America. Flowers nearly throughout the year.

10. CÉNCHRUS L.

Annual or perennial grasses, with flat, convolute or complanate leaf-blades and terminal spikes. Spikelets 2–6, in an ovoid or globose involucre, consisting of two thick hard valves which are exteriorly armed with stout spines and sometimes also with basal bristles which are thickened at the base, the involucres articulated to the rachis and readily deciduous, carrying the persistent spikelets with them. Scales 4, awnless, the first and second empty, the first small or minute, the third equalling or longer than the second, enclosing a palet and also sometimes a staminate flower, the fourth scale chartaceous, firmer, enclosing a palet of similar texture and a perfect flower. Stamens 3. Styles often connate at the very base. Stigmas plumose. [Ancient Greek name for some grass.] About 20 species in temperate and tropical regions. Type species: *Cenchrus echinatus* L.



1. Cenchrus tribuloides L. BUR-GRASS. (Fig. 31.) Stems at first erect, later prostrate and forming mats, 8′–2° long, branching: leaf-sheaths compressed; blades 2½′–5′ long, 2″–4″ wide, smooth or rough, usually flat: spikes 1′–2½′ long: involucres 6–20, 1½″–2½″ broad, enclosing 2 spikelets, pubescent: the spines 1½″–2″ long; spikelets [illegible] long, usually not exserted beyond the involucre.

In sandy soil, especially on the coast and beaches. Native [illegible] United States. Flowers from spring to autumn. Its burs perhaps brought to [illegible] by ocean currents. Flowers [illegible] to autumn.

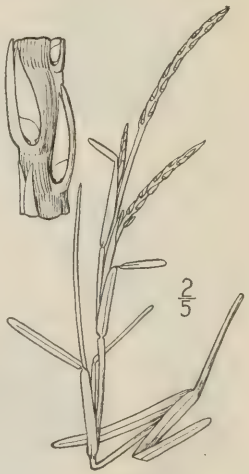


2. **Cenchrus echinàtus** L. Southern Burgrass. (Fig. 32.) Culms finally prostrate and rooting at the nodes, branched; leaf-sheaths loose; blades 4′–16′ long, 2½″–8″ wide, smooth or rough, flat: spikes 1½′–5′ long, finally more or less exserted; involucres 20–50, densely crowded, containing 4–6 spikelets, glabrous, green to purplish, pubescent, villous at the base, the spines 1½″–2″ long, the bristles at the base numerous, slender, distinctly barbed for their whole length; spikelets 3″–3½″ long, exserted from the involucre.

Common as a weed in cultivated and waste grounds. Native. Southeastern United States and tropical America. Its burs perhaps brought to Bermuda by attachment to migratory birds. Flowers from spring to autumn.

11. **STENOTÀPHRUM** Trin.

Perennial creeping branched grasses, with rather stout flattened culms and short linear leaves. Spikelets spicate or panicled, acute, mostly 2-flowered, imbedded in depressions on one side of the flattened rachis; scales 4; first scale small or minute, second about as long as the spikelet, third similar to the second, subtending a staminate flower, fourth rigid, enclosing a perfect flower. Stigmas plumose. [Greek, a narrow depression.] A few species of tropical and subtropical distribution, the following typical.



1. **Stenotaphrum secundàtum** (Walt.) Kuntze. Crab-grass. (Fig. 33.) Widely creeping, sometimes 15° long, glabrous, rooting at the lower nodes. Leaf-sheaths keeled, flattened, the blades linear, 1½′–6′ long, 2″–5″ wide, blunt and rounded at the apex; spikelets about 3″ long. [*Ischaemum secundatum* Walt.; *S. americanum* Schrank; *S. dimidiatum* of A. H. Moore; *S. glabrum* Trin.]

In nearly all dry or moist situations. Native. Southeastern United States and tropical America. Flowers nearly throughout the year. Its seeds perhaps transported to Bermuda by migratory birds. One of the best grasses for forming lawns in warm and tropical climates.

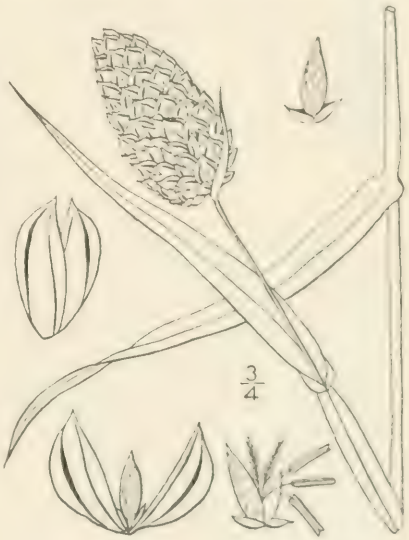
Zizania aquàtica L., the Wild Rice of northeastern North America, is recorded by Reade as once found by him in marshes north of Hamilton, but it has not been seen in Bermuda by recent collectors and probably would not long exist.

12. PHÁLARIS L.

Annual or perennial grasses with flat leaves, the inflorescence spike-like, capitate or a narrow panicle. Spikelets crowded, 1-flowered. Scales 5, the first and second about equal in length, strongly compressed laterally, usually wing keeled; third and fourth scales much smaller or reduced to mere rudiments; fifth scale subtending a palet similar to itself and a perfect flower. Stamens 3. Styles distinct. Stigmas plumose. Grain oblong, free, smooth, enclosed in the indurated scales. [Greek, alluding to the shining grain.] About 10 species, mostly natives of southern Europe. Type species: *Phalaris arundinacea* L.

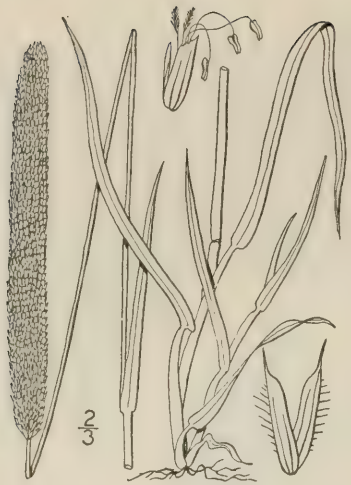
1. Phalaris canariénsis L. CANARY-GRASS. (Fig. 34.) Culms 1°–3° tall. Leaves 2′–12′ long, 2″–6″ wide, strongly scabrous; spikes ½′–1½′ long, ovoid; spikelets 3″–4″ long; outer scales whitish with green nerves; third and fourth scales about half the length of the fifth, broadly lanceolate, thin-membranous, sparingly hairy; fifth scale about two-thirds as long as the spikelet, pubescent with appressed hairs.

Occasional in waste and cultivated grounds. Introduced, presumably by seed for caged birds. Native of Europe. Flowers in spring. Introduced into the United States.



13. PHLÈUM L.

Annual or perennial grasses with flat leaves and spicate inflorescence. Spikelets 1-flowered. Scales 3; the 2 outer empty, membranous, compressed, keeled, the apex obliquely truncate, the midnerve produced into an awn; the third scale much shorter, broader, hyaline, truncate, denticulate at the summit; palet narrow, hyaline. Stamens 3. Styles distinct, somewhat elongated. Stigmas plumose. Grain ovoid, free, enclosed in the scale and palet. [Name Greek, taken from Pliny; originaly applied to some very different plant.] About 10 species, inhabiting the temperate zones of both hemispheres, the following typical. The English name *Cat tail Grass* is applied to all the species



1. Phleum praténse L. TIMOTHY. HERD-GRASS. (Fig. 35.) Glabrous and smooth or very nearly so throughout. Culms 1°–4° tall, erect, simple; sheaths usually exceeding the internodes, sometimes shorter, the upper one long and not inflated, or very slightly so; leaves 3′–9′ long, 2″–3″ wide, smooth or scabrous; spike usually elongated, cylindric, 1½′–7′ in length, 2½″–4″ in diameter; outer scales of the spikelet, exclusive of the awn, 1″–2½″ long, ciliate on the keel, the awn less than half their length.

Occasional in fields and waste grounds, introduced as hay, from the United States, but not naturalized, the climate being too warm. Native of the north temperate zone.

Alopecurus praténsis L., MEADOW FOXTAIL GRASS, is recorded by Reade as occasionally met with, and also mentioned by Jones and by Lefroy. It resembles Timothy, but the spikelets readily fall away from the spike at maturity.

14. SPORÓBOLUS R. Br.

Perennial or rarely annual grasses, with flat or convolute leaves and open or contracted panicles. Spikelets generally small, 1-flowered, occasionally 2–3-flowered. Scales in the 1-flowered spikelets 3, membranous; the 2 outer empty, the first somewhat shorter; the third scale equalling or longer than the empty ones; palet 2-nerved. Stamens 2–3. Styles very short, distinct. Stigmas plumose. Grain free, and often early deciduous. [Greek, referring to the deciduous grain.] About 100 species, in tropical and temperate regions, very numerous in America. Type species: *Agrostis indica* L.

Rootstocks elongated; leaves short, spreading.
Rootstocks short; leaves long, erect.

1. *S. virginicus.*
2. *S. Berteroanus.*

1. Sporobolus virginicus (L.) Kunth. SEASHORE RUSH-GRASS. (Fig. 36.) Culms 6′–2° tall, erect or sometimes decumbent, from a stout rootstock. Sheaths numerous, short, overlapping and crowded at the lower part of the culm, smooth, glabrous or sometimes pilose on the margins and at the throat; leaves 1′–8′ long, 2″ wide or less at the base, distichous, acuminate; involute on the margins and at the apex, smooth beneath, scabrous above or sometimes sparingly hairy; panicle 1′–3′ long, 2″–5″ thick, dense and spikelike, usually exserted; spikelets 1″–1¼″ long, the outer scales about equal, acute, smooth and glabrous; third scale acute, slightly shorter than the second. [*Agrostis virginica* L.; *S. littoralis* Kunth.]

Common on beaches and in salt marshes. Native. Southeastern United States and tropical America. Probably transported to Bermuda by floating. Flowers in summer and autumn. (*S. purgans* of Rein?)



2. Sporobolus Berteroànus (Trin.) Hitchc. & Chase. BULL GRASS. (Fig. 37.) Slender, wiry, 3° tall or less. Leaves smooth, nearly erect, 1″–3″ wide, long-attenuate, the lower ones 6′–10′ long, the upper shorter; panicle narow, often 1° long; spikelets about 1½″ long, crowded on the short appressed branches of the panicle; second scale ovate-oblong, about one half as long as the spikelet. [*Vilfa Berteroana* Trin.; *S. angustus* Buckley.]



Common in dry situations. Native. Southern United States and Bahamas. Flowers in summer and autumn. Its seeds transported to Bermuda by birds or by winds. Recorded as *S. indicus* R. Br. by Jones, Reade, Lefroy, Hemsley, Millspaugh and Moore, and (?) as *S. elongatus* R. Br., by Lefroy.

15. POLYPÒGON Desf.

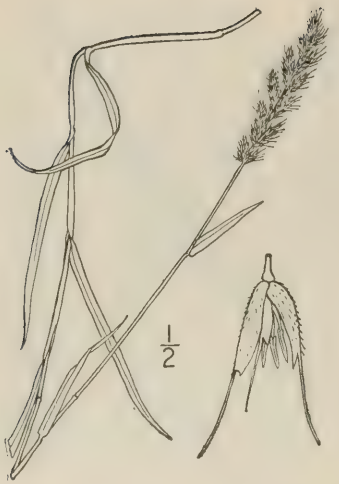
Mostly annual grasses, with decumbent or rarely erect culms, flat leaves and spike-like panicles. Spikelets 1-flowered; scales 3; the 2 outer empty, each extended into an awn; third scale smaller, generally hyaline, short-awned from below the apex, subtending a palet and perfect flower; palet shorter than the scale. Stamens 1–3. Styles short, distinct. Stigmas plumose. Grain free, enclosed in the scale and palet. [Greek, in allusion to the many long awns which resemble a beard.] About 10 species, widely distributed in temperate and warm regions, rare in the tropics, *P. monspeliensis* typical.



Empty scales with awns 2-5 times their length; panicle silky, shining; annual. 1. *P. monspeliensis*
Empty scales with awns of about their length; panicle dull; perennial. 2. *P. littoralis*

1. Polypogon monspeliènsis (L.) Desf. BEARD-GRASS. (Fig. 38.) Culms 2° tall or less, erect from a usually decumbent base, plant annual. Leaves 1½′–6″ long, 1½″–2″ wide, scabrous, especially above; panicle 1′–4′ in length, dense and spike-like, the branches ascending; spikelets crowded; outer empty scales about 1″ long, obtuse, slightly bifid, scabrous, bearing a more or less faint awn 2″–3″ long; third scale much shorter, erose-truncate, hyaline, bearing a delicate awn, inserted below the apex.

In waste places [illegible]. Naturalized from Europe. Naturalized in [illegible] and eastern North America. Flowers in summer and autumn.



2. Polypogon littorâlis Smith. SHORT-AWNED OR PERENNIAL BEARD-GRASS. (Fig. 39.) Tufted, perennial, erect, 6′–2½° tall. Leaves 6′ long or less, 2″–4″ wide; panicle 1½′–6′ long, moderately dense, dull, with ascending branches 4″–10″ long; outer empty scales about 1½″ long, scabrous, bearing an awn of about the same length; flowering scales awnless, much shorter than the empty ones.

Roadsides, waste and cultivated grounds. Abundant. Introduced from Europe. Naturalized in the southern and western United States. Flowers in summer and autumn.

16. AVÈNA L.

Annual or perennial grasses with panicled, large spikelets. Spikelets 2–several-flowered, the lower flowers perfect, the upper often imperfect or staminate; scales 4–many, the 2 lower ones empty, sometimes unequal, membranous, persistent, the flowering ones rounded on the back, acute, usually bearing a dorsal awn and often 2-toothed at the apex, deciduous; palet narrow 2-toothed. Stamens 3. Styles short, distinct; stigmas plumose. Grain oblong, deeply furrowed. [Old Latin name for the Oat.] About 30 species, widely distributed in temperate regions. Type species: *Avena sativa* L.

Flowering scales more or less hispid, the awn distinctly spiral. 1. *A. fatua.*
Flowering scales glabrous, awnless or with a nearly straight awn. 2. *A. sativa.*

1. Avena fátua L. WILD OAT. (Fig. 40.) Culms 1°–4° tall, erect, simple, stout, smooth and glabrous. Sheaths smooth, or scabrous at the summit, sometimes sparingly hirsute, the lower often overlapping; leaves 3′–8′ long, 1″–4″ wide; panicle open, 4′–12′ in length, the branches ascending; spikelets 2–4-flowered, drooping; outer scales ¾′–1′ in length, smooth, enclosing the flowering scales; flowering scales 6″–9″ long, with a ring of stiff brown hairs at the base, pubescent with long rigid brown hairs, bearing a long bent and twisted awn.

Collected by F. S. Collins at Flatt's, 1914. Introduced. Native of the Old World. Widely naturalized in the western United States.



2. Avena sativa L. OATS. (Fig. 41.) Annual, glabrous; culms erect, 1½°–3° tall. Sheaths smooth; leaf-blades 1° long or less, 4″–6″ wide; panicle 4′–9′ long, its branches ascending; spikelets erect, spreading or drooping, the outer, empty scales about 10″ long, the flowering scales glabrous, awnless, or with a filiform straight awn sometimes a little twisted at the base.



Occasional on roadsides and in waste grounds, not persisting. Probably always from grain imported for fodder. Native of Europe and Asia. Widely cultivated in temperate regions.

17. ARÚNDO L.

Tall perennial grasses, with thick stout somewhat woody culms, broad flat leaves and dense panicles. Spikelets 2–many-flowered, the rachilla-internodes glabrous. Scales 4–many; empty scales narrow; flowering scales broader, 3-nerved, hairy on the back. Stamens 3. Styles distinct; stigmas plumose. [Name said to be derived from the Celtic for water.] About 6 species, natives of the Old World, the following typical.



1. Arundo Dònax L. COW-CANE. (Fig. 42.) Culms stout, erect, 9°–25° tall. Leaves often 2° long or more and 2′–3′ wide; panicle 1½°–3° long, oblong; spikelets numerous, crowded.

Persistent after planting, [illegible] in marshes and waste grounds [illegible]. Native of the Mediterranean region. Flowers in summer and autumn. Very conspicuous by its large size and [illegible]. The variegated-leaved race is commonly planted for ornament.

18. KOELÈRIA Pers.

Annual or perennial tufted grasses, with narrow flat or involute leaf-blades and usually dense spike-like cylindric panicles. Spikelets numerous, crowded, 2–5-flowered, the flowers perfect or the upper ones staminate. Scales [illegible], membranous, the 2 lower empty, narrow, unequal, the [illegible] similar to the second, sometimes mucronate or short-awned at or just below the apex, the upper scales gradually smaller, the upper 1 or 2 often empty, [illegible]

hyaline, 2-keeled, 2-toothed. Stamens 3. Styles very short. Stigmas plumose. [In honor of Georg Ludwig Koeler, German botanist.] Some 15 species widely distributed. Type species: *Poa nitida* Lam.



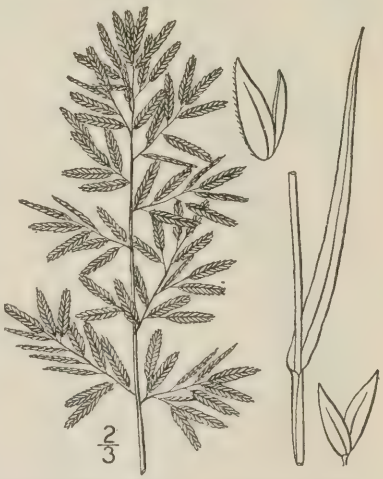
1. Koeleria phleoìdes (Vill.) Pers. TIMOTHY KOELERIA. (Fig. 43.) Annual; culms slender, glabrous, 3′–18′ high. Leaves narrowly linear, acuminate, 2′–5′ long, 1″–1½″ wide, more or less pilose; spike-like panicle narrowly cylindric, 1′–3′ long, 3″–5″ thick; spikelets very numerous, 4–5-flowered, long-villous, the flowering scales short-awned. [*Festuca phleoides* Vill.]

In fields and waste grounds. Naturalized from Europe. Flowers in spring.

19. ERAGRÓSTIS Beauv.

Annual or perennial grasses, rarely dioecious, from a few inches to several feet in height, the spikelets in contracted or open panicles. Spikelets 2–many-flowered, more or less flattened. Two lower scales empty, unequal, shorter than the flowering ones, keeled, 1-nerved, or the second 3-nerved; flowering scales membranous, keeled, 3-nerved; palets shorter than the scales, prominently 2-nerved or 2-keeled, usually persisting on the rachilla after the fruiting scale has fallen. Stamens 2 or 3. Styles distinct, short. Stigmas plumose. Grain free, loosely enclosed in the scale and palet. [Greek etymology doubtful, perhaps signifying a low grass, or Love-grass, an occasional English name.] A genus of about 120 species, widely distributed throughout all warm and temperate countries. Type species: *Briza Eragrostis* L.

Palets glabrous; panicle open.
1. *E. megastachya.*
Palets long-ciliate; panicle dense.
2. *E. ciliaris.*



1. Eragrostis megastàchya (Koel.) Link. STRONG-SCENTED ERAGROSTIS. (Fig. 44.) Annual; culms 6′–2° tall, erect, or decumbent at the base, usually branched. Sheaths sparingly pilose at the throat; leaves 2′–7′ long, 1″–3″ wide, flat, smooth beneath, scabrous above; panicle 2′–6′ in length, the branches spreading or ascending, 1′–2′ long; spikelets 8–35-flowered, 3″–8″ long, about 1½″ wide, very flat; empty scales acute, the first slightly shorter than the second; flowering scales obtuse, about 1″ long, the lateral nerves prominent. [*Poa magastachya* Koel.; *E. major* Host.]

A weed in cultivated ground, Warwick Pond, 1905; roadside, Paget, 1913. Introduced. Native of Europe. Widely naturalized in temperate North America. Flowers in summer and autumn.

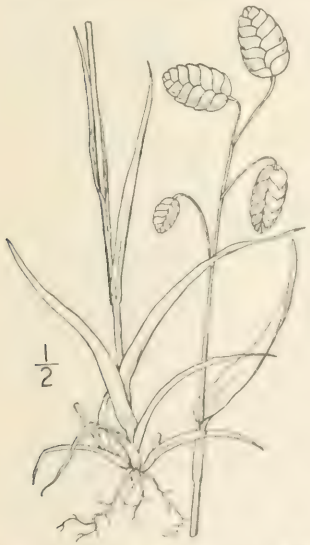
2. Eragrostis ciliàris (L.) Link. FRINGED ERAGROSTIS. (Fig. 45.) Annual; culms densely tufted, slender, erect or ascending, 1° high or less; leaf-sheaths with a tuft of hairs at the top and usually ciliate, the blades flat, 1′–3½′ long, 1″–2½″ wide; panicle narrow, dense, 1′–4′ long, its branches appressed; spikelets small, 6–16-flowered; palet-nerves long-ciliate. [*Poa ciliaris* L.]



Dry sandy or rocky soil. Naturalized. Southern United States, West Indies and tropical continental America. Abundant in flower on top of Wreck Hill, Sandy's, Sept., 1912.

20. BRÌZA L.

Annual or perennial grasses, with flat or convolute leaves and open or rarely contracted panicles. Spikelets flattened, tumid, many-flowered, nodding, the flowers perfect. Scales thin-membranous, strongly concave, the 2 lower empty, 3–5-nerved, somewhat unequal; flowering scales imbricated, broader than the empty ones, 5–many-nerved; uppermost scales often empty; palets much shorter than the scales, hyaline, 2-keeled or 2-nerved. Stamens 3. Styles distinct. Stigmas plumose. Grain usually free, enclosed in the scale and palet. [Greek name for some grain, perhaps rye.] About 12 species, natives of the Old World and temperate S. Am. Type species: *Briza minor* L.



1. Briza màxima L. QUAKING-GRASS. (Fig. 46.) Annual, tufted; culms glabrous, slender, 2½° high or less. Leaves narrowly linear, 2′–5′ long, 1″–2″ wide, acuminate; ligule acute, elongated; spikelets few, large, 5″–8″ long, 4″–6″ wide, ovate, 9–15-flowered, nodding on filiform peduncles, shining; flowering scales loosely pubescent, about as long as the glabrous empty lower ones.

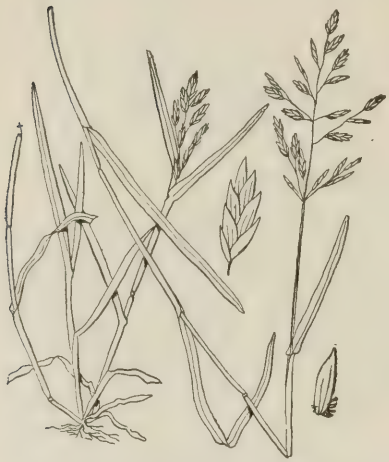
Frequent on banks, in fields and in lawns. Introduced from Europe for cultivation as an ornamental grass in gardens. Flowers in spring and summer. Naturalized in Jamaica, and introduced into the United States.

21. POA L.

Annual or perennial grasses, with flat or convolute leaves and contracted or open panicles. Spikelets [illegible] flattened, compressed, the rachilla usually glabrous, flowers [illegible] feet, or rarely dioecious. Scales membranous, keeled, the 2 lower empty

1–3-nerved; the flowering scales longer than the empty ones, generally with a tuft of cobwebby hairs at the base, 5-nerved, the marginal nerves usually pubescent, often also the dorsal one; palets a little shorter than the scales, 2-nerved or 2-keeled. Stamens 3. Styles short, distinct. Stigmas plumose. Grain free, or sometimes adherent to the palet. [Name Greek, for grass or herbage.] A genus of about 150 species, widely distributed in all temperate and cold regions. The English name *Meadow-grass* is often applied to most of the species. Type species: ***Poa pratensis* L.**

Annual with fibrous roots. 1. *P. annua.*
Perennial by running rootstocks.
  Empty scales elliptic-oblong; flowering scales ovate-lanceolate in side-view. 2. *P. pratensis.*
  Empty scales lanceolate; flowering scales linear in side-view. 3. *P. nemoralis.*

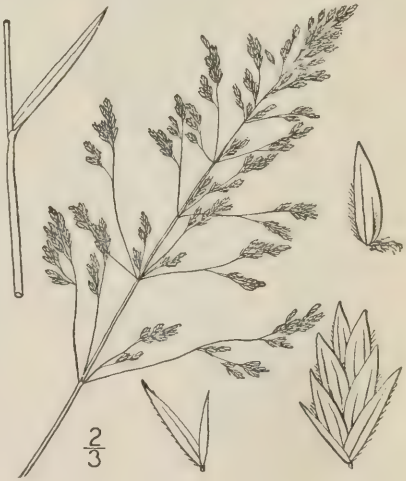


1. Poa ánnua L. Annual Meadow-grass. Low Spear-grass. (Fig. 47.) Culms 2′–10′ tall, from an annual root, erect or decumbent at the base, somewhat flattened, smooth. Sheaths loose, usually overlapping; leaves ½′–4′ long, wide, smooth; panicle ½′–4′ in length, open, branches spreading, naked at the base; spikelets 3–5-flowered, 1½″–2½″ long; lower scales smooth, the first narrow, acute, 1-nerved, about two thirds as long as the broad and obtuse 3-nerved second one; flowering scales distinctly 5-nerved, the nerves pilose below.

Common in waste and cultivated places. Naturalized from Europe. Native also of Asia. Widely naturalized in temperate North America. Flowers from spring to autumn.

2. Poa praténsis L. Kentucky Blue-grass. June-grass. (Fig. 48.) Culms 1°–3½° tall, from long running rootstocks; leaves smooth or rough, those of the culm 2′–6′ in length, the basal much longer; panicle 2½′–8′ long, usually pyramidal, the branches spreading or ascending, sometimes flexuous, divided and spikelet-bearing above the middle; spikelets 3–5-flowered, 2″–2½″ long, exceeding their pedicels; scales acute; flowering scales webbed at the base, 5-nerved, the marginal nerves and mid-nerve silky-pubescent below, the intermediate ones naked.

Cliffs, south shores near Tucker's Town, abundant in 1909; lawn Abbesford, 1914. Introduced, probably in hay. Native of the north temperate zone. Flowers in spring and summer.



3. Poa nemorālis L. Wood Poa. (Fig. 49.) Culms 1°–4° tall, from rootstocks; leaves smooth or rough, those of the stem usually 3′ or more long; panicle 3′–10′ long, the usually lax branches spreading or ascending, often flexuous, up to 3′ long, dividing and spikelet-bearing above the middle; spikelets 2–3-flowered, 1½″–2″ long, exceeding their pedicels; scales acute, the empty basal ones lanceolate, equal or the first a little shorter; flowering scales linear in side-view, webbed at the base, 5-nerved, the intermediate nerves rather obscure, the mid-nerve and lateral nerves pubescent below the middle, but not so copiously as in *Poa pratensis*.

Collected by F. S. Collins at Flatt's, 1913. Introduced. Native of Europe. Introduced as a waif in the eastern United States. Flowers in summer.



22. SCLEROPÒA Griseb.

Low, annual, tufted, glabrous grasses, with narrow, flat leaf-blades, and several–many-flowered compressed spikelets in narrow panicles, the panicle branches short and stiff. Spikelets with 2 empty lower scales, the flowering scales 5-nerved, rounded on the back. Stigmas borne near the apex of the ovary. Grain linear-oblong, obtuse. [Greek, hard *Poa*.] Two species of the Mediterranean region, the following typical.



1. Scleropoa rigida (L.) Griseb. Hard Grass. (Fig. 50.) Somewhat glaucous; culms several, erect or ascending, 3′–18′ high. Leaves narrowly linear, 2′–4′ long, about 1½″ wide, acuminate, the short ligule lacerate; panicle ½′–3½′ long, its branches 4″–8″ long, spreading or ascending; spikelets 2″–3″ long, 5–11-flowered. [*Poa rigida* L.; *Sclerochloa rigida* Beauv.; *Festuca rigida* Kunth.]

In waste grounds and on [illegible] and hillsides. Naturalized from southern Europe. Flowers from spring to autumn. Introduced into the southern United States.

23. **DESMAZÈRIA** Dumort.

Low, tufted grasses, with short narrow leaves, and several–many-flowered, compressed spikelets, sessile and 2-ranked in narrow spikes, the rachis angled and flexuous. Scales nearly equal, or the lower a little larger than the others, all convex or obtusely keeled. Grain channeled on the inner face. [Named for M. Desmazières.] A few species of Europe and Africa. Type species: *Poa sicula* Jacq.



1. Desmazeria loliàcea (Huds.) Nyman. DARNEL DESMAZERIA. (Fig. 51.) Annual, glabrous; culms rather stiff, ascending or spreading, 2′–5′ long. Leaves ½′–2′ long, about 1″ wide; spike 1′–2′ long; spikelets alternate, in 2 rows, oblong, 2″–3″ long, 7–11-flowered; flowering scales about 1″ long, obtuse, finely nerved. [*Poa loliacea* Huds.; *Catapodium loliaceum* Link.]

Waste ground Spanish Point, 1905. Introduced. Native of southern Europe. Flowers in summer and autumn.

24. **BRÒMUS** L.

Annual or perennial grasses, with usually closed leaf-sheaths, flat blades and contracted or open panicles, the branches often nodding. Spikelets usually large, often drooping, few–many-flowered, the flowers perfect or the upper ones imperfect. Scales few–many, membranous, the 2 lower empty, persistent, narrow, unequal, acute or the second sometimes short-awned; flowering scales longer and often broader, rounded on the back, at least below, usually awned, rarely awnless, the awn dorsal and inserted just below the 2-toothed apex; palet shorter than the scale, 2-keeled. Stamens 3, rarely fewer. Ovary crowned by a villous appendage, at the base of which arise the very short but distinct styles. [Greek name for a kind of oat.] About 60 species, widely distributed. Type species: *Bromus secalinus* L.

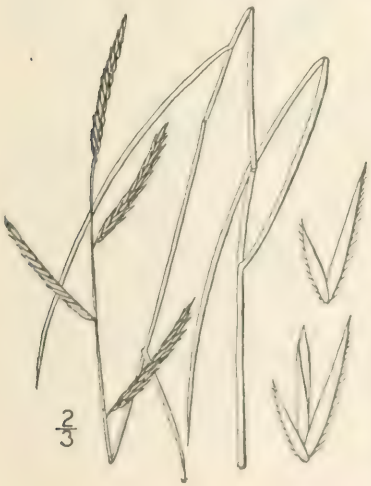
1. Bromus unioloides (Willd.) H.B.K. SOUTHERN CHESS. (Fig. 52.) Annual. Culms 1½°–3½° tall: leaf-sheaths commonly pubescent, or sometimes glabrous; blades rough, sometimes sparingly pubescent, 2″–3″ wide; panicle usually long and narrow, 6′–20′ long: spikelets 8″–17″ long, 7–11-flowered, the flowering scales thick, firm, 6″–8″ long, each commonly with a short stout awn. [*Poa unioloides* Willd.]

Locally plentiful in fields and on hillsides. Naturalized. Native of warm-temperate America. Flowers in spring and summer.



25. **SPARTINA** Schreb.

Perennial glabrous grasses, with long horizontal rootstocks, flat or involute leaves, and an inflorescence of one-sided spreading or erect alternate spikes. Spikelets 1-flowered, narrow, deciduous, borne in two rows on the rachis, articulated with the very short pedicels below the scales. Scales 3; the two outer empty, keeled, very unequal; the third subtending a perfect flower, keeled, equalling or shorter than the second; palet often longer than its scale, 2-nerved. Stamens 3. Styles filiform, elongated. Stigmas filiform, papillose or shortly plumose. Grain free. [Greek, referring to the cord-like leaves of some species.] About 7 species, widely distributed in saline soil, a few in fresh-water marshes. Type species: *Spartina Schreberi* Gmel.



1. Spartina pàtens (Ait.) Muhl. SALT GRASS. (Fig. 53.) Culms 1′–4′ tall, erect, or decumbent at base, smooth. Leaves 6′–2½° long, 1″–2″ broad, involute, attenuate into a long tip, smooth and glabrous beneath; spikes 2–10, 1′–2′ long, usually ascending, more or less peduncled, the rachis slightly scabrous; spikelets 3″–4″ long; outer scales acute, scabrous-hispid on the keel, the first usually rather less than one half as long as the second; third scale [illegible] on the upper part, emarginate or 2-toothed at the apex, longer than the first and exceeded by the palet. [*Dactylis patens* Ait.; *Spartina juncea* Willd.]

Rocky and sandy coasts [illegible] and along Cattle Harbor, [illegible] Rocky Island, and [illegible] Blue Hill. Native. Coast of eastern North America. Probably [illegible] to Bermuda by [illegible]. Flowers in summer and autumn. Commonly [illegible] by [illegible] Meadow [illegible].

26. **CAPRÌOLA** Adans.

Perennial grasses with short flat leaves and spicate inflorescence, the spikes digitate. Spikelets 1-flowered, secund. Scales 3, the 2 lower empty, keeled; flowering scale broader, membranous, compressed; palet a little shorter than the scale, hyaline, 2-keeled. Stamens 3. Styles distinct. Stigmas short, plumose. Grain free. [Name medieval Latin for the wild goat, that feeds on this grass in waste rocky places.] Four known species, of which three are Australian, the following typical one widely distributed.



1. Capriola Dáctylon (L.) Kuntze. BERMUDA-GRASS. SCUTCH-GRASS. DOG'S-TOOTH GRASS. RUNNING GRASS. HELL-GRASS. DEVIL GRASS. (Fig. 54.) Culms 4′–12′ tall, erect, from long creeping and branching stolons, smooth and glabrous. Sheaths glabrous or somewhat hairy, crowded at the bases of the culms and along the stolons; leaves 1′–3′ long, 1″–2½″ wide, flat, smooth beneath, scabrous above; spikes 4–5, ½′–2′ in length, digitate; rachis flat; spikelets 1″ long; outer scales hispid on the keel, narrow, the first shorter than the second, about two thirds as long as the broad and strongly compressed third one. [*Panicum Dactylon* L.; *Cynodon Dactylon* Pers.]

Common in all dry places, a pernicious weed in gardens, but desirable for forming lawns. Naturalized from Europe. Naturalized in the eastern United States. Flowers nearly throughout the year. The name Bermuda-grass, by which this grass is most widely known is unfortunate, as it is not a native of Bermuda.

27. **EUSTÁCHYS** Desv.

Perennial grasses, with flat or folded usually obtuse leaf-blades and spicate inflorescence, the spikes single, in pairs, or 3–many and digitate. Spikelets usually 1-flowered, rarely 2-flowered, sessile, crowded in 2 rows. Scales 4, rarely 5, the 2 lower empty, persistent, unequal, keeled, the first generally acute, the second oblong, truncate or 2-lobed at the apex, short-awned, the others awnless, mucronate, or short-awned, firmer than the empty scales, the third scale enclosing a perfect flower and a palet, the fourth scale empty, or rarely enclosing a staminate flower. [Greek, beautiful spikes.] About 8 species, native of tropical America, the following typical. The genus is united with *Chloris* by some authors.

1. Eustachys petraèa (Sw.) Desv. WEST INDIAN GRASS. (Fig. 55.) Culms 1°–3° tall: leaf-blades 1° long or less, 3″–5″ wide, smooth: spikes 3–11, usually 4–6, erect, 1½′–4′ long: spikelets about 1″ long: scales 4, the second, exclusive of the awn, about ¾″ long, 2-toothed at the apex, the teeth triangular, acute or obtusish, the awn about ½″ long; third scale about 1″ long, in side view elliptic and about ½″ wide, the awn short or wanting; fourth scale in side view obovate-elliptic, rounded at the apex, awnless. [*Chloris petraea* Sw.]



Common in dry soil, a weed in cultivated grounds. Naturalized. Native of the southeastern United States, West Indies and tropical continental America. Flowers from spring until autumn.

28. ELEUSÌNE Gaertn.

Tufted annual or perennial grasses, with flat leaves and spicate inflorescence, the spikes digitate or close together at the summit of the culm. Spikelets several-flowered, sessile, closely imbricated in two rows on one side of the rachis, which is not extended beyond them; flowers perfect or the upper staminate. Scales compressed, keeled; the 2 lower empty; the others subtending flowers, or the upper empty. Stamens 3. Styles distinct. Stigmas plumose. Grain loosely enclosed in the scale and palet. [From the Greek name of the town where Ceres was worshipped.] Species 6, natives of the Old World. Type species: *Cynosurus coracanus* L.

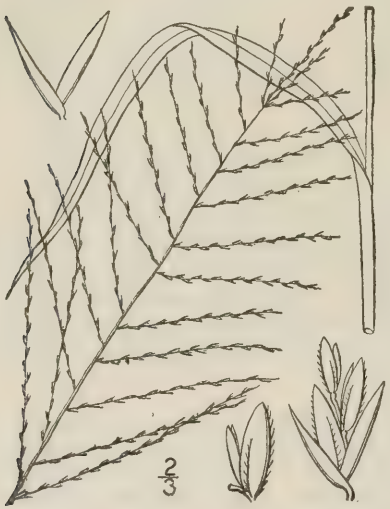


1. Eleusine indica (L.) Gaertn. WIRE-GRASS. CRAB-GRASS. YARD-GRASS. (Fig. 56.) Culms 6′–2° tall, tufted, erect, or decumbent at the base. Sheaths loose, overlapping and often short and crowded at the base of the culm, glabrous or sometimes sparingly villous; leaves 3′–12′ long, 1″–3″ wide, smooth or scabrous; spikes 2–10, 1′–3′ long, whorled or approximate at the summit of the culm or one or two sometimes distant; spikelets 3–6-flowered, 1½–2 long; scales acute, minutely scabrous on the keel, the first 1-nerved, the second 3–7-nerved, the others 3–5-nerved. [*Cynosurus indicus* L.]

Common in waste, dooryards and [illegible] places. Abundant over North America except the extreme north. Naturalized from the warmer regions of the [illegible] Flowers nearly throughout the year.

29. **LEPTÓCHLOA** Beauv.

Usually tall annual grasses, with flat leaves and numerous spikes forming a simple panicle. Spikelets usually 2–many-flowered, flattened, alternating in two rows on one side of the rachis. Scales 4 to many; the 2 lower empty, keeled, shorter than the spikelet; the flowering scales keeled, 3-nerved. Palet 2-nerved. Stamens 3. Styles distinct. Stigmas plumose. Grain free, enclosed in the scale and palet. [Greek, in allusion to the slender spikes.] About 12 species, natives of the warmer regions of both hemispheres. Type species: *Cynosurus virgatus* L.



1. Leptochloa filiformis (Lam.) Beauv. Northern Leptochloa. (Fig. 57.) Culms 1°–4° tall, finally branching. Sheaths, at least the lower ones, commonly more or less hirsute; leaves 2½′–10′ long, 5″ or less wide, rough; inflorescence 6′–2° long; spikes generally elongated, ascending, 2′–6′ long; spikelets about 1½″ long; scales usually 5, the outer empty 2 acute, equal, or the first somewhat shorter than the second, the first scale usually a little shorter than the first flowering scale. [*Eleusine mucronata* Michx.; *Festuca filiformis* Lam.]

Waste or cultivated grounds. Apparently uncommon. Introduced. Native of the southeastern United States and tropical America. Flowers in autumn.

30. **LÓLIUM** L.

Annual or perennial grasses, with flat leaves and terminal spikes. Spikelets several-flowered, solitary, sessile and alternate in the notches of the usually continuous rachis, compressed, the edge of the spikelet (backs of the scales) turned toward the rachis. Scales rigid; lower scale empty in the lateral spikelets, and the 2 lower empty in the terminal; flowering scales rounded on the back, 5–7-nerved; palets 2-keeled. Stamens 3. Styles distinct, very short. Stigmas 2, plumose. Grain adherent to the palet. [Latin name for Darnel.] About 6 species, natives of the Old World. Type species: *Lolium perenne* L.

1. Lolium multiflòrum Lam. AWNED RAY-GRASS. AWNED DARNEL. (Fig. 58.) Culms tufted, 2°–3½° tall. Sheaths smooth and glabrous; leaves 4′–8′ long, 1½″–4″ wide; spikes often 1° long; spikelets 20–30, 7″–10″ long, the flowering scales bearing an awn equalling or a little shorter than themselves.

Roadsides, Abbotsford, Mount Hope and south side of Harrington Sound, 1914. Introduced. Native of Europe. Flowers in spring and summer. Appears as of recent introduction. Naturalized in the United States.



31. **HÓRDEUM** [Tourn.] L.

Annual or perennial grasses, with flat leaves and terminal cylindric spikes. Spikelets 1-flowered, usually in 3's at each joint of the rachis, the lateral generally short-stalked and imperfect; rachilla produced beyond the flower, the lower empty scales often reduced to awns and forming an apparent involucre around the spikelets. Empty scales rigid; flowering scales rounded on the back, 5-nerved at the apex, awned; palet scarcely shorter than the scale, 2-keeled. Stamens 3. Styles very short, distinct. Grain usually adherent to the scale, hairy at the summit. [Latin name for barley.] About 20 species, widely distributed in both hemispheres. Type species: *Hordeum vulgare* L.



1. Hordeum pusíllum Nutt. LITTLE BARLEY. (Fig. 59.) Culms 4′–16′ tall, erect, or decumbent at the base; leaves ½′–3′ long, ½″–1″ wide, erect, smooth beneath, rough above; spike 1′–3′ in length; spikelets usually in 3's, the central one containing a palet and perfect flower, the lateral imperfect; scales awned, the empty ones scabrous, those of the central spikelet and the lower ones of the lateral spikelets dilated above the base; flowering scales smooth, that of the central spikelet 3″–4″ long, short-awned, the corresponding scale in the lateral spikelets smaller and very short-stalked.

Waste grounds [illegible] land [illegible] Native of western North America [illegible] Flowers in [illegible]

Hordeum satìvum Juss., BARLEY, presumably Asiatic in origin, is occasionally grown; a large patch was seen at Rose Cottage in 1914.

32. ÉLYMUS L.

Tall grasses, with usually flat leaves and dense terminal spikes. Spikelets 2–several-flowered, sessile, usually in pairs, occasionally in 3's or more, in alternate notches of the continuous or jointed rachis, the empty scales forming an apparent involucre to the cluster. Two lower scales empty, narrow, acute, sometimes awned, entire; flowering scales shorter, rounded on the back, 5-nerved, usually bearing an awn. Palet a little shorter than the scale, 2-keeled. Stamens 3. Styles very short, distinct. Stigmas plumose. Grain sparsely hairy at the summit, adherent to the palet. [Greek, to roll up, referring to the involute palet.] About 40 species, natives of temperate regions. Type species: *Elymus avenarius* L.



1. Elymus virgínicus L. TERRELL-GRASS. VIRGINIA WILD RYE. (Fig. 60.) Culms 1°–3° tall; sheaths sometimes pubescent, the uppermost often inflated and enclosing the peduncle and the base of the spike; leaves 5′–11′ long, 2″–8″ wide, rough; spike 2′–7′ in length, dense, stout, upright; spikelets divergent from the rachis, 2–3-flowered; empty scales thick and rigid, lanceolate, ½′–1′ long, including the short awn, 5–7-nerved; flowering scales 3″–4″ long, glabrous, bearing a rough awn 2″–9″ in length, or rarely awnless.

Found by A. H. Moore on Ireland Island in 1905. Introduced from eastern North America.

Arundinaria técta (Walt.) Muhl., the SMALL CANE of the southeastern United States, is mentioned by Lefroy as native in Bermuda, and doubtfully recorded by Jones, but it has not been observed here by subsequent collectors, and was probably mistaken for some other grass. [*Arundo tecta* Walt.]

Saccharum officinàrum L., SUGAR CANE, a tall, broad-leaved species with conspicuously jointed culms, which are used as sticks for chewing, is frequently grown in the marshes. In the early years of the colony its cultivation was much more extensive, and Lefroy notes that in 1675 it was thought necessary to pass a law to prevent the destruction of cedars for sugar-boiling.

Zea Màys L., INDIAN CORN, MAISE, extensively grown in several races, is one of the most important food-plants both for green corn, and for fodder,

and is the only valuable cereal crop of the colony. Verrill records that it was introduced in 1610.

Zea japónica Van Houtte, recorded by Jones, is a low race of the preceding, with small ears of corn, its leaves white-striped, said to have originated in Japan.

Triticum vulgàre L., WHEAT, was formerly grown but with indifferent success, and its cultivation ceased many years ago.

Bambos vulgàris Schrad., CHINESE BAMBOO, a giant of the Grass Family, its jointed culms reaching forty feet or more in height, is planted for ornament and thrives luxuriantly.

Bambos glaucéscens Merrill, LOW POLE BAMBOO, East Indian, seen at Paget Rectory in 1914, is a small species, with upright branches, and lanceolate leaves only about 1′ long. I am indebted to the Kew botanists for the determination of this plant.

Another species of *Bambos*, with slender culms about 15° high, and leaves about 8′ long by ½′ wide, has been planted at the Agricultural Station, and several other kinds of Bamboos have been planted experimentally.

Cortaderia argéntea (Nees) Stapf, PAMPAS GRASS, a large South American species, is grown for ornament on lawns, and is a highly decorative plant, the culms up to 6° high, the numerous, elongated leaves linear, the large plume-like panicles white and shining. [*Gynerium argenteum* Nees.]

Pennisetum macrostàchyum (Brongn.) Trin., PURPLE PENNISETUM, of the Molucca Islands, grown for ornament, is a grass 6°–8° high, with purple leaves 1° long or more, about 1′ wide, the narrow purple spikes 8′–12′ long, the flowers subtended by tufts of long, roughened bristles.

Pennisetum Rüppellii Steud., RUPPELL'S PENNISETUM, Abyssinian, also grown for ornament, is similar to the preceding with a purple spike up to 12′ long, but its involute leaves are only 1″–2″ wide and the bristles are plumose. It has also been observed on a roadside near Salt Kettle.

Family 2. **CYPERACEAE** J. St. Hilaire.

SEDGE FAMILY.

Grass-like or rush-like herbs. Stems (culms) slender, solid (rarely hollow), triangular, quadrangular, terete or flattened. Roots fibrous (many species perennial by long rootstocks). Leaves narrow, with closed sheaths. Flowers perfect or imperfect, arranged in spikelets, one (rarely 2) in the axil of each scale (glume, bract), the spikelets solitary or clustered, 1–many-flowered. Scales 2-ranked or spirally imbricated, persistent or deciduous. Perianth hypogynous, composed of bristles, or [illegible] scales, rarely calyx-like, or sometimes wanting. Stamens 1–3, rarely more. Filaments slender or filiform. Anthers 2-celled. Ovary 1-celled, [illegible]

anatropous, erect. Style 2–3-cleft or rarely simple or minutely 2-toothed. Fruit a lenticular, plano-convex, or trigonous achene. Endosperm mealy. Embryo minute.

About 65 genera and 3000 species, of very wide geographic distribution. The achenes of many species are transported by birds, and most of the native sedges have probably reached Bermuda by them or by winds.

Achene not enclosed in a perigynium.	
Scales of the spikelets 2-ranked.	
Spikelets with several or many perfect flowers.	1. *Cyperus.*
Spikelets with but one perfect flower.	2. *Kyllinga.*
Scales of the spikelets spirally imbricated.	
Spikelets with several or many perfect flowers.	
Style wholly deciduous.	
Perianth-bristles 4–6.	3. *Scirpus.*
Perianth-bristles none.	4. *Fimbristylis.*
Base of the style persistent as a tubercle on the achene.	
Spikelets capitate, involucrate; culm leafy.	5. *Dichromena.*
Spikelet only 1, naked; leaves mere basal sheaths.	6. *Eleocharis.*
Spikelets only 1–4-flowered, some of the flowers imperfect.	
Style, or its base, persistent as a tubercle on the achene.	7. *Rynchospora.*
Style wholly deciduous.	8. *Mariscus.*
Achene enclosed in a perigynium.	9. *Carex.*

1. **CYPÈRUS** [Tourn.] L.

Annual or perennial sedges. Culms in our species simple, triangular, leafy near the base, and with 1 or more leaves at the summit forming an involucre to the simple or compound, umbellate or capitate inflorescence. Rays of the umbel sheathed at the base, usually very unequal, one or more of the heads or spikes commonly sessile. Spikelets flat or subterete, the scales readily falling away from the rachis as they mature, or persistent and the spikelets falling away from the axis of the head or spike with most of the scales attached. Scales concave, conduplicate or keeled, 2-ranked, all flower-bearing or the lower ones empty. Flowers perfect. Perianth none. Stamens 1–3. Style 2–3-cleft, deciduous from the summit of the achene. [Ancient Greek name for these sedges.] About 600 species, of wide distribution in tropical and temperate regions. Type species: *Cyperus esculentus* L.

Style 2-cleft; achene lenticular; annuals.	
Scales obtuse; achene ovate-orbicular.	1. *C. flavescens.*
Scales acute; achene oblong.	2. *C. paniculatus.*
Style 3-cleft; achene trigonous.	
Spikelets falling away from the axis of the spike, the lower pair of scales persistent.	
Annual; spikelets nearly terete.	3. *C. speciosus.*
Perennials; spikelets flattened.	
Spikelets ½″ wide, greenish brown.	4. *C. globulosus.*
Spikelets 1″–1¼″ wide, chestnut brown.	5. *C. brunneus.*
Scales falling away from the persistent rachis of the flattened spikelets.	
Basal leaves elongated; spikelets spicate.	
Spikelets purple brown; achene linear-oblong.	6. *C. rotundus.*
Spikelets straw color; achene obovoid.	7. *C. esculentus.*
Basal leaves reduced to sheaths; spikelets digitate.	8. *C. alternifolius.*

1. Cyperus flavéscens L. YELLOW CYPERUS. (Fig. 61.) Annual; culms very slender, tufted, leafy below, 3′–12′ tall, mostly longer than the leaves. Leaves 1″–1½″ wide, smooth, the longer usually exceeding the inflorescence; clusters terminal and sessile, or on 1–4 short rays; spikelets in 3's–6's, linear, subacute, yellow, many-flowered, flat, 4″–9″ long, 1½″–2″ broad; scales ovate, obtuse, 1-nerved, appressed, twice as long as the orbicular-obovate black obtuse lenticular shining achene; stamens 3; style deeply 2-cleft; superficial cells of the achene oblong.

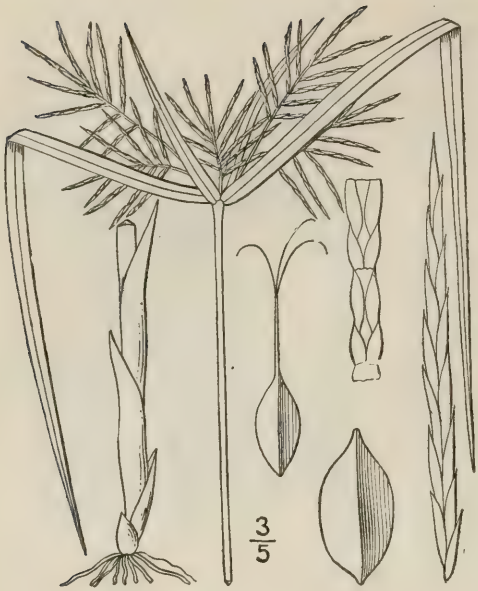
Grassy places, Pembroke Marsh, 1905. Serpentine, March, 1912. Native. Eastern United States; Cuba; Porto Rico; Mexico; Europe. Flowers in summer and autumn. This pretty sedge was seen in abundance at the localities mentioned; while not recorded by the earlier authors I think it a native species; its minute fruits may have reached Bermuda by the agency of birds in recent times.





2. Cyperus paniculàtus Rottb. GATES' CYPERUS. (Fig. 62.) Annual, bright green. Leaves ½″–2″ wide; culms slender, tufted, 4′–16′ tall, often surpassing the leaves; bracts of the involucre 3–5, surpassing the umbel, the longer ones up to 8′ long; umbel with 3–8 rays, or rarely nearly capitate; spikelets few, linear or linear-lanceolate, 3″–7″ long, acute; scales light chestnut-brown, oblong-lanceolate, acute, shining, striate, deciduous at maturity; achenes oblong, grayish, abruptly apiculate, fully half as long as the scale. [*Cyperus Gatesii* Torr.; *C. Nuttallii* of Reade.]

Frequent in salt and brackish marshes. Southeastern United States, West Indies and continental tropical America. Flowers in summer and autumn. Native.



3. Cyperus speciòsus Vahl. MICHAUX'S CYPERUS. (Fig. 63.) Annual; culms usually tufted, 4′–20′ tall, reddish toward the base. Leaves rough-margined, 1½″–2½″ wide, the midvein prominent; leaves of the involucre much exceeding the umbel; umbel 3–7-rayed, the primary rays 1′–6′ long; involucels narrow; spikelets subterete, very narrowly linear, 4″–12″ long, less than 1″ thick, 10–30-flowered, falling away from the axis at maturity; scales dull brown, thin, appressed, ovate, obtuse, faintly 3–5-nerved on the back; rachis-wings broad, clasping the achene, persistent; stamens 3; style 3-cleft, slightly exserted; achene pale, 3-angled, about one half as long as the scale. [*C. Michauxianus* Schultes; *C. flexuosus* of Reade, Lefroy and H. B. Small; *C. odoratus* of Hemsley.]

Borders of marshes. Eastern and southern United States. Cuba(?) Flowers from spring to autumn. Closely related to *Cyperus ferax* L. C. Richard, of the southern United States and tropical America. Native.

4. Cyperus globulòsus Aublet. BALDWIN'S CYPERUS. (Fig. 64.) Perennial by tuber-like corms; culms slender, smooth, erect or reclining, mostly longer than the leaves. Leaves pale green, 1½″–2″ wide, those of the involucre 5–10, the longer usually much exceeding the umbel; umbel 6–13-rayed; the rays filiform, their sheaths short, mucronate; spikelets many, 2″–12″ long, ½″ wide, linear, flat, capitate in globose heads; scales thin, pale green, appressed, ovate-lanceolate, acute, 9–13-nerved, with narrow scarious margins; joints of the rachis broadly winged; stamens 3; style 3-cleft; achene oblong-obovoid, obtuse, one half as long as the scale, about twice as long as thick. [*Cyperus ligularis* of Reade; *C. Baldwinii* Torr.]



Sandy fields, hillsides and borders of marshes. Native. Southeastern United States, West Indies and tropical continental America. Flowers in summer and autumn.

5. Cyperus brúnneus Sw. COAST CYPERUS. (Fig. 65.) Perennial, pale green. Leaves overtopped by the stout culm, 1″–4″ wide, smooth, sometimes involute; culms erect, usually solitary, 1°–2½° tall, 3-angled, smooth; bracts of the involucre 4–5, all of them or the longer ones surpassing the umbel, spreading; umbel compound, capitate, or some of the rays becoming ½′–2′ long; spikelets linear or linear-lanceolate, 5″–8″ long, 1″–1¼″ wide, chestnut-colored, densely crowded; scales oval or ovate-oval, often apiculate, ribbed; achenes 3-angled, elliptic-obovoid, dark-brown, granular.

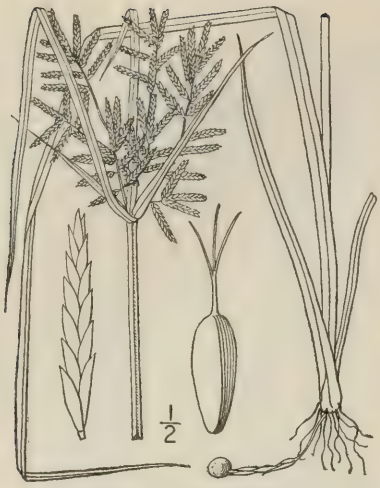


Coastal sands, Paget, 1905. Native. Coasts of Florida and the West Indies. Probably transported to Bermuda by floating. Flowers in summer and autumn. This sedge is not recorded as Bermudian by any previous author; it may have reached Bermuda recently. It was not abundant when collected by us in 1905.



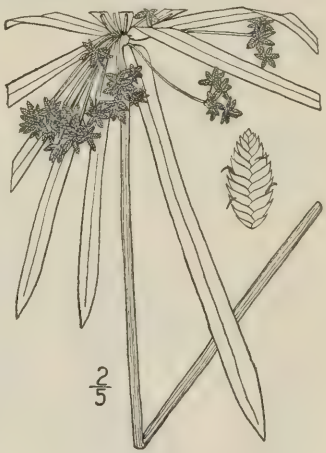
6. Cyperus rotúndus L. NUTGRASS. (Fig. 66.) Perennial by scaly tuber-bearing rootstocks; culm rather stout, 4′–2° high, usually longer than the leaves. Leaves 1½″–3″ wide, those of the involucre 3–5; umbel 3–8-rayed, the longer rays 2′–4½′ long; spikelets linear, clustered, few in each cluster, acute, 4″–10″ long, 1″–1½″ wide; scales dark purple-brown or with green margins and centre, ovate, acute, appressed when mature, about 3-nerved on the keel; stamens 3; style 3-cleft, its branches exserted; achene 3-angled, about one half as long as the scale. [*C. hydra* Michx.]

Common as a weed in cultivated and waste grounds. Native [illegible] United States, West Indies, tropical continental America, tropical and subtropical regions of the Old World. Flowers from spring to autumn. The plant is freely propagated by its tubers which are readily detached in plowing or [illegible] this makes it a difficult weed to eradicate.



7. Cyperus esculéntus L. YELLOW NUT-GRASS. (Fig. 67.) Perennial by scaly tuber-bearing rootstocks; culm usually stout, 1°–3° tall, shorter than the leaves or longer. Leaves light green, 2″–4″ wide, the midvein prominent; those of the involucre 3–6, the longer much exceeding the inflorescence; umbel 4–10-rayed, often compound; spikelets numerous in loose spikes, straw-color or yellowish-brown, flat, spreading, ½′–1′ long, about 1½″ wide, many-flowered; scales ovate-oblong, subacute, 3–5-nerved; rachis narrowly winged; stamens 3; style 3-cleft; achene obovoid, obtuse, 3-angled.

Occasional in cultivated grounds. Native. United States, West Indies, tropical continental America, tropical and temperate regions of the Old World. Flowers in summer and autumn.



8. Cyperus alternifòlius L. UMBRELLA SEDGE. (Fig. 68.) Perennial by short rootstocks, glabrous; culms stout, clustered, 3°–4½° high, smooth and 3-angled. Basal leaves reduced to lanceolate sheaths; leaves of the involucre 12–20, spreading, 10′ long or less, 2″–5″ wide, longer than the inflorescence; umbel decompound, often 8′ broad; rays numerous, nearly filiform; heads very numerous; spikelets few, digitate, linear, many-flowered, blunt, 4″–5″ long, about 1″ wide; scales greenish-yellow, lanceolate, acute, appressed; achene oblong, a little shorter than the scale.

Occasional in marshes and along roads. Introduced by cultivation as an ornamental sedge, and escaped. Native of Africa. Flowers from spring to autumn. Naturalized in the West Indies.

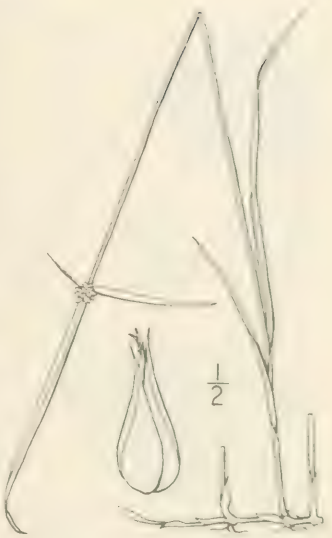
Cyperus Papỳrus L., PAPYRUS, Egyptian, successfully grown for six years in a tub at Orange Valley, and observed there in 1914, is a very large sedge, with 3-sided culms, 7°–9° high, the numerous, nearly filiform leaves of the involucels 8′–12′ long.

2. KỲLLINGA Rottb.

Annual or perennial sedges, with slender triangular culms, leafy below, and with 2 or more leaves at the summit forming an involucre to the strictly sessile, simple or compound, dense head of spikelets. Spikelets numerous, compressed, falling away from the axis of the head at maturity, consisting of only 3 or 4 scales, the 1 or 2 lower ones small and empty, the middle one fertile, the upper empty or staminate. Joints of the rachis wingless or narrowly winged. Scales 2-ranked, keeled. Perianth none. Stamens 1–3. Style 2–3-cleft, deciduous from the summit of the achene. Achene lenticular or 3-angled. [In honor of Peter Kylling, a Danish botanist of the seventeenth century.] About 45 species, natives of tropical and temperate regions. Type species: *Kyllinga monocephala* Rottb.

1. Kyllinga brevifòlia L. SHORT-LEAVED KYLLINGA. (Fig. 69.) Perennial by slender rootstocks, pale green. Leaves mostly shorter than the culm, ½″–1¼″ wide, smooth; culms very slender or filiform, 4′–15′ tall, smooth; bracts of the involucre 3, one erect, the others spreading; spike solitary, globose or ovoid, 2½″–5″ long, greenish, with many spikelets; spikelets oblong-ovoid, 1″–1½″ long, acuminate; scales various, the 2 outer minute, the third and fourth ovate, with recurved tips and serrulate-ciliate keels; achenes lenticular, orbicular-obovate, about ½″ long. [*K. monocephala* of Reade, Lefroy, H. B. Small and Hemsley.]

Common along the borders of marshes. Native. Southeastern United States, West Indies, tropical America; Old World tropics.



3. SCÍRPUS L.

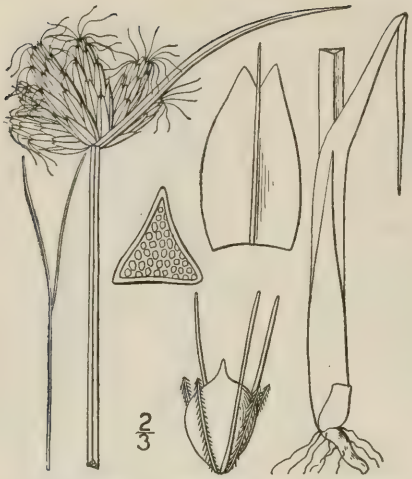
Annual or perennial very small to very large sedges, with leafy culms or the leaves reduced to basal sheaths. Spikelets terete or somewhat flattened, solitary, capitate, spicate or umbellate, subtended by a 1–several-leaved involucre or the involucre wanting in some species. Scales spirally imbricated all around, usually all fertile, the 1–3 lower sometimes empty. Flowers perfect. Perianth of 1–6, slender or rigid, short or elongated, barbed, pubescent or smooth bristles, or none in some species. Stamens 2 or 3. Style 2–3-cleft, not swollen at the base, wholly deciduous from the achene, or its base persistent as a subulate tip. Achene triangular, lenticular or plano-convex. [Latin, Bulrush, said to be from *sirs*, Celtic for rushes.] About 150 species of wide geographic distribution. Type species: *Scirpus lacustris* L.

Spikelets few, appearing as if lateral: culm 3-angled.
Involucral leaf short, stout. 1. *S. Olneyi.*
Involucral leaf long, slender. 2. *S. americanus.*
Spikelets several or numerous, umbellate; culm terete. 3. *S. validus.*

1. Scirpus Olneyi A. Gray. OLNEY'S BULRUSH. (Fig. 70.) Perennial by rootstocks; culms stout, sharply 3-angled with concave sides, 14″–6′ tall, leaves 1–3, 1′–5′ long, or sheaths sometimes leafless; spikelets capitate in dense clusters of 5–12, oblong or ovoid-oblong, obtuse, 2½″–4″ long, the involucral leaf short, stout, erect, ½′–1½′ long; scales oval or orbicular, dark brown with a green midvein, emarginate or mucronulate, glabrous; bristles equalling or slightly shorter than or equalling the achene, downwardly barbed; stamens 2–3; style 2-cleft; achene obovate, plano-convex, brown, mucronate.



In Warwick Marsh, 1905; marsh near White Bay, 1914. Native [illegible] Gulf and Pacific coasts of the United States, Cuba. Extinct in [illegible]

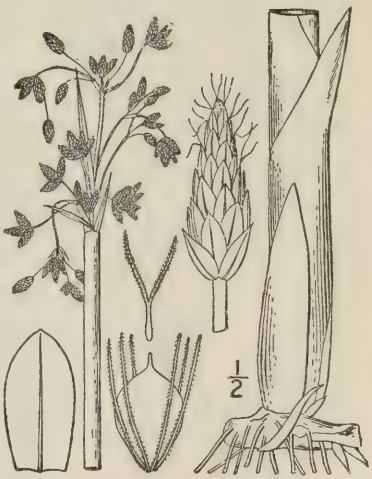


2. Scirpus americànus Pers. THREE-SQUARE. CHAIR-MAKER'S RUSH. (Fig. 71.) Perennial by long rootstocks; culms sharply triangular, erect, stiff, 1°–3½° tall. Leaves 1–3, narrowly linear, keeled, shorter than the culm; spikelets oblong-ovoid, acute, 4″–6″ long, capitate in clusters of 1–7, appearing as if lateral; involucral leaf slender, 1′–4′ long; scales broadly ovate, brown, often emarginate or sharply 2-cleft at the apex, the midvein extended into a subulate awn sometimes 1″ long, the margins scarious; bristles 2–6, downwardly barbed, shorter than or equalling the achene; stamens 3; achene obovate, planoconvex, smooth, dark brown, mucronate.

Marsh near Whale Bay, 1914. Native. Continental North America. Flowers in summer.

3. Scirpus vàlidus Vahl. AMERICAN GREAT BULRUSH. MAT-RUSH. (Fig. 72.) Perennial by rootstocks; culm stout, terete, smooth, erect, 3°–9° tall, sometimes ¾′ in diameter, sheathed below. Involucral leaf solitary, erect, shorter than the umbel; umbel compound, appearing lateral, its primary rays ½′–4′ long; bracts linear-lanceolate; spikelets becoming oblong-cylindric, sessile or some of them peduncled, in capitate clusters of 1–5, 2½″–8″ long, 1½″–2″ in diameter; scales ovate or oblong, with a strong midvein which is sometimes excurrent; bristles 4–6, downwardly barbed, equalling or longer than the achene; stamens 3; style 2-cleft; achene planoconvex, obovate, gray, abruptly mucronate, dull. [*S. lacustris* of Reade, Lefroy, Hemsley, Harshberger and H. B. Small.]

Frequent in marshes. Native. Continental temperate and tropical America; West Indies.



4. FIMBRÍSTYLIS Vahl.

Annual or perennial sedges. Culms leafy below. Spikelets umbellate or capitate, terete, several- to many-flowered, subtended by a 1–many-leaved involucre, their scales spirally imbricated all around, mostly deciduous, all fertile. Perianth none. Stamens 1–3. Style 2–3-cleft, pubescent or glabrous, its base much enlarged, falling away from the summit of the achene at maturity. Achene lenticular, biconvex, or 3-angled, reticulated, cancellate, or longitudinally ribbed or striate in our species. [Greek, in allusion to the fringed style of some species.] Some 125 species, widely distributed in temperate and tropical regions. Type species: *Fimbristylis acuminata* Vahl.

1. Fimbristylis castànea (Michx.) Vahl. MARSH FIMBRISTYLIS. (Fig. 73.) Perennial by a thick base; culms slender, 3-angled, 2½° high or less, usually exceeding the leaves. Leaves involute, less than 1″ wide; leaves of the involucre 2–4, short; umbel simple or compound, the rays ½′–2′ long; central spikelets sessile; spikelets oblong, 3″–6″ long, about 1½″ in diameter; scales thin, brown with a lighter midvein, broadly oblong or nearly orbicular, obtuse or mucronate; stamens 2–3; style 2-cleft; achene obovate or oblong, biconvex, pale brown. [*Scirpus castaneus* Michx.; *Fimbristylis spadicea* of Moore, and referred to that species by C. B. Clarke.]

Frequent in marshes. Native. Eastern United States. Bahamas and Cuba. Summer and autumn.



5. **DICHRÓMENA** Michx.

Leafy-stemmed sedges, perennial by rootstocks, the spikelets in a terminal head involucrate by the upper leaves. Spikelets compressed, several-many-flowered. Scales spirally imbricated, several with imperfect flowers, or empty. Perianth none. Stamens 3. Style 2-cleft. Achene lenticular, transversely rugose, crowned with the broad base of the style (tubercle). [Greek, alluding to the two-colored involucral leaves.] About 20 species, of America, the following typical.



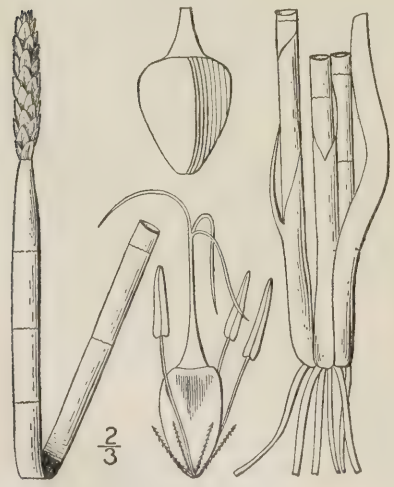
1. Dichromena colorà ta (L.) A. S. Hitchcock. WHITE-HEADED RUSH. NARROW-LEAVED DICHROMENA. (Fig. 74.) Glabrous; culm slender, erect, rather sharply triangular, 1°–2½° tall. Leaves distant, narrowly linear, about 1″ wide, much shorter than the culm, those of the involucre 4–6, reflexed when mature, yellowish white at the base; head globose, 5″–10″ in diameter; spikelets narrowly oblong, acute; scales membranous, lanceolate, nearly white, keeled, subacute at the apex; achene obovate, brown, nearly truncate at the summit, compressed, covered by the tubercle. [*Schoenus colorata* L.; *D. leucocephala* Michx.; *Rhynchospora alba* of Vahl, Reuter, H. B. Small and Harvey; *R. glauca* of Vahl, Lessing and Hemsley.]

Common in marshes. Native. Southeastern United States and West Indies. Flowers from spring to autumn.

6. ELEÓCHARIS R. Br.

Annual or perennial sedges. Culms simple, triangular, quadrangular, terete, flattened or grooved, the leaves reduced to sheaths or the lowest very rarely blade-bearing. Spikelets solitary, terminal, erect, several–many-flowered, not subtended by an involucre. Scales concave, spirally imbricated all around. Perianths of 1–12 bristles, usually retrorsely barbed, wanting in some species. Stamens 2–3. Style 2-cleft and achene lenticular or biconvex, or 3-cleft and achene 3-angled, but sometimes with very obtuse angles and appearing turgid. Base of the style persistent on the summit of the achene, forming a terminal tubercle. [Greek, referring to the growth of most of the species in marshy ground.] About 140 species, widely distributed. Type species: *Scirpus palustris* L.

Spikelet little thicker than the stout culm; scales coriaceous.
  Culm nodose-septate. 1. *E. interstincta.*
  Culm continuous. 2. *E. cellulosa.*
Spikelet much thicker than the slender culm; scales not coriaceous.
  Style 2-cleft; achene lenticular; annuals.
    Upper sheath truncate, 1-toothed. 3. *E. capitata.*
    Sheath membranous, hyaline. 4. *E. praticola.*
  Style 3-cleft; achene trigonous; perennials.
    Achene smooth. 5. *E. bermudiana.*
    Achene finely reticulated. 6. *E. rostellata.*

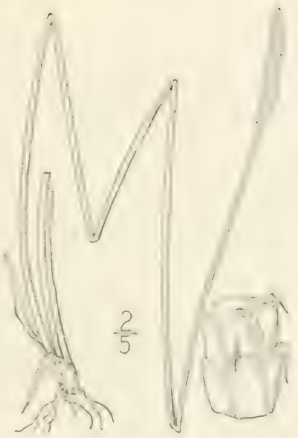


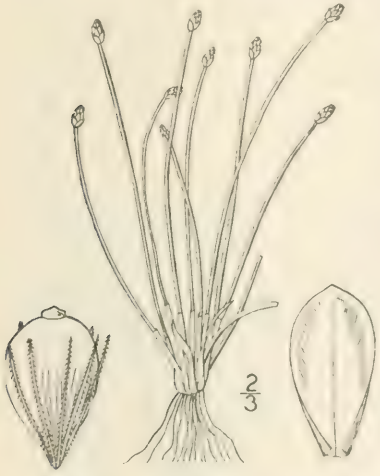
1. Eleocharis interstincta (Vahl) R. & S. KNOTTED SPIKERUSH. (Fig. 75.) Perennial by stout rootstocks; culms terete, hollow, nodose, papillose, 3° tall or less, the sterile ones sharp-pointed. Sheaths membranous, the lower sometimes bearing short blades; spikelet terete, cylindric, many-flowered, subacute, 1′–1¾′ long, 2″ in diameter, not thicker than the culm; scales ovate, orbicular or obovate, obtuse or the upper acute, narrowly scarious-margined, faintly many-nerved, persistent; bristles about 6, rigid, retrorsely barbed, as long as the body of the achene or shorter; stamens 3; style 3-cleft, exserted; achene obovoid, brown, shining, with minute transverse ridges, convex on one side, very obtusely angled on the other, 2 or 3 times as long as the conic acute black broad-based tubercle. [*Scirpus interstinctus* Vahl; E. *equisteoides* Torr.; *Scirpus plantagineus* of Lefroy and of Hemsley; apparently mistaken for *Equisetum palustre* by Lefroy and by H. B. Small.]

Frequent in marshes. Native. Eastern United States; West Indies; tropical continental America. Flowers in summer and autumn.

2. Eleocharis cellulòsa Torr. ROUND-STEMMED SPIKE-RUSH. (Fig. 76.) Perennial by horizontal rootstocks. Culms invested by discolored sheaths at the base, terete above, 1°–2½° tall, continuous; spikelet cylindric, ½′–1¼′ long, 1½″–2½″ thick; scales broadly obovate, with white hyaline margins, appressed, rounded at the apex, minutely nerved; perianth-bristles 6, slightly unequal, nearly smooth; style 3-cleft; achenes broadly obovoid, copiously pitted, about as long as the bristles; tubercle deltoid, about ½ as broad as the widest part of the achene. [*E. palustris* of Reade and of H. B. Small.]

Occasional in marshes. Native. Southeastern United States and West Indies. Flowers in summer and autumn.





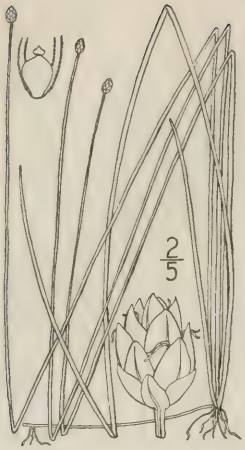
3. Eleocharis capitàta (L.) R. Br. CAPITATE SPIKE-RUSH. (Fig. 77.) Annual; roots fibrous; culms densely tufted, nearly terete, almost filiform, 2′–12′ tall. Upper sheath 1-toothed; spikelet ovoid, obtuse, much thicker than the culm, 1½″–3″ long, 1″–1½″ thick, many-flowered; scales broadly ovate, obtuse, firm, pale or dark brown with a greenish midvein, narrowly scarious-margined, persistent; style 2-cleft; bristles 5–8, slender, downwardly hispid, as long as the achene; achene obovate, jet black, smooth, shining, nearly ½″ long; tubercle depressed, apiculate, constricted at the base, very much shorter than the achene. [*Scirpus capitatus* L.; *E. melanocarpus* of Britton; *Scirpus melanocarpus* of H. B. Small and Lefroy.]

Common in marshes. Native. Southeastern United States, West Indies, tropical continental America and Old World tropics. Flowers nearly throughout the year.



4. Eleocharis pratícola Britton. MEADOW SPIKE-RUSH. (Fig. 78.) Annual, small. Culms slender, tufted, 3′ tall or less. Upper sheath hyaline, membranous; spikelet ovoid or oblong-ovoid, about 1″ long; scales brown, lanceolate or oblong-lanceolate, lax in age; perianth-bristles 5–7, retrorsely barbed, shorter than the achene; style 2-cleft; achene obovoid, about ¼″ long, dark brown, shining, the tubercle very small.

Pembroke and Warwick Marshes. Native. Southeastern United States. Flowers in spring and presumably later in the year.



5. Eleocharis bermudiàna Britton. BERMUDA SPIKE-RUSH. (Fig. 79.) Perennial by very slender rootstocks; culms slender, erect, ½°–1½° high, tufted. Basal sheath oblique, 1-toothed; spikelet short-ovoid to oblong, obtuse, much thicker than the culm, 2″–3½″ long, 1½″–2″ thick, many-flowered; scales ovate, whitish, obtuse, persistent; style 3-cleft; bristles 3 or 4, downwardly barbed, as long as the achene and tubercle or somewhat longer; achene oblong-obovate, 3-angled, brown, shining, ½″ long, smooth, short-beaked under the short-conic, acute tubercle.

Occasional along borders of marshes. Endemic. Nearest related to *E. albida* Torr. of the eastern United States. Referred by Hemsley to *E. melanocarpa* Torr. and by Clarke to *E. Berlandieri* (Britton) Clarke. First named as a distinct species in Journal N. Y. Botanical Garden, **13**: 191.

6. Eleocharis rostellàta Torr. BEAKED SPIKE-RUSH. (Fig. 80.) Perennial; culms slender, wiry, the fertile ones erect or ascending, the sterile reclining or recurving and rooting at the tip, often 5°–6° long. Upper sheath truncate; spikelet oblong, 10–20-flowered, 3″–6″ long; scales ovate, green with a darker midrib; bristles 4–8, retrorsely barbed, longer than the achene and tubercle; style 3-cleft; achene 3-angled, reticulated.

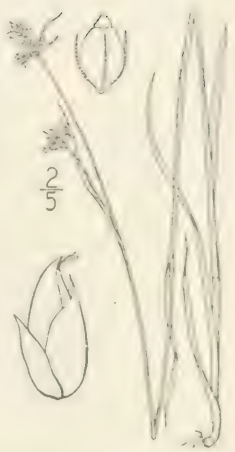
Abundant in marsh east of Camden, 1912. Native. United States and Cuba.



7. RYNCHÓSPORA Vahl.

Leafy sedges, mostly perennial by rootstocks, with erect 3-angled or terete culms, narrow flat or involute leaves, and ovoid oblong or fusiform, variously clustered spikelets. Scales thin, 1-nerved, imbricated all around, usually mucronate by the excurrent midvein, the lower empty. Upper flowers imperfect, the lower perfect. Perianth of 1–20 (mostly 6) upwardly or downwardly barbed or scabrous bristles, or wanting in some species. Stamens commonly 3. Style 2-cleft, 2-toothed or rarely entire. Achene lenticular or swollen, not 3-angled, smooth or transversely wrinkled, capped by the persistent base of the style (tubercle), or in some species by the whole style. [Greek, referring to the beak-like tubercle.] About 200 species, of wide geographic distribution, most abundant in warm regions. Type species: *Rynchospora aurea* Vahl.

Achenes smooth, not stalked. 1. *R. distans*.
Achene wrinkled, stalked. 2. *R. stipitata*.



1. Rynchospora distans (Michx.) Vahl. DISTANT-CLUSTERED BEAKED-RUSH. (Fig. 81.) Perennial, pale green. Culms tufted, slender, 1°–2½° tall; leaves filiform or nearly so by the involute margins; spikelets ovoid, about 1½″ long, several together in terminal and axillary clusters; perianth-bristles mostly 6, usually upwardly barbed, about as long as the achene; achenes oval or oblong-oval, nearly 1″ long, excluding the broad conic smooth tubercle. [*Schoenus distans* Michx.; *Rynchospora dommucensis* A. H. Moore; *R. fusca* of Lefroy.]

Frequent in marshes. Native. Southeastern United States and West Indies. Flowers in summer and autumn.



2. Rynchospora stipitàta Chapm. STIPITATE BEAKED-RUSH. (Fig. 82.) Perennial, bright green. Culms tufted, 2½°–3½° tall, arching above, 3-angled; leaves elongated, 2″–5″ wide, smooth; spikelets about 4″ long, narrowly ovoid, numerous, in 4–5 compound axillary corymbs; perianth-bristles 6–8, upwardly barbed; achenes lenticular, 1–3 in a spikelet, orbicular-obovoid, stalked, the body about ¾″ long, finely transversely wrinkled, less than ½ as long as the bristles; tubercle conic, setose. [*Rynchospora florida* of Lefroy.]

Frequent along marshes. Native. Florida. Flowers in summer and autumn. Its inflorescence much infested by a black smut.

8. MARÌSCUS [Hall.] Zinn.

Perennial leafy sedges, the spikelets oblong or fusiform, few-flowered, variously clustered. Scales imbricated all around, the lower empty, the middle ones mostly subtending imperfect flowers, the upper usually fertile. Perianth none. Stamens 2 or sometimes 3. Style 2–3-cleft, deciduous from the summit of the achene, its branches sometimes 2–3-parted. Achene ovoid to globose, smooth or longitudinally striate. Tubercle none. [Greek, referring to the branched inflorescence of some species.] About 30 species, natives of tropical and temperate regions. Type species: *Schoenus Mariscus* L.



1. Mariscus jamaicènsis (Crantz) Britton. SAW-GRASS. PRICKLY SEDGE. (Fig. 83.) Culm stout, 3°–9° high, obtusely 3-angled. Leaves very long, glabrous, 3″–10″ wide, the margins spinulose-serrulate; umbels several or numerous, decompound, forming a large panicle; spikelets mostly 2–5 together at the ends of the raylets, narrowly ovoid, acute, 2″–2½″ long; uppermost scale subtending a perfect flower; stamens 2; achene ovoid, abruptly sharp-pointed, wrinkled, narrowed to the base, 1″ long. [*Cladium jamaicense* Crantz; *C. occidentale* Schrad.; *C. Mariscus* of Hemsley and of H. B. Small.]

Common in marshes. Native. Southern United States, West Indies and tropical continental America. Flowers in summer and autumn. This is the largest sedge of the Bermuda flora and the only one with serrate-margined leaves. It covers large areas in some of the marshes, forming dense masses of vegetation.

9. CÀREX L.

Grass-like sedges, perennial by rootstocks. Culms mostly 3-angled. Leaves 3-ranked, the upper elongated or very short (bracts) and subtending the spikes of flowers, or wanting. Flowers monoecious or dioecious, solitary in the axils of bracts (scales). Spikes either wholly pistillate, wholly staminate, or bearing both staminate and pistillate flowers (androgynous). Perianth none. Staminate flowers of 3 stamens, the filaments filiform. Pistillate flowers of a single pistil with a style and 2 or 3 stigmas, borne on a very short axis in the axil of a sac-like bractlet or second bract called the perigynium (utricle), which completely encloses the achene. Achene 3-angled, lenticular or plano-convex. A vast genus, of more than 1000 species, widely distributed, most abundant in the temperate zones. Type species: *Carex pulicaris* L.

Spikes sessile with few staminate flowers at their bases; styles 2. 1. *C. albolutescens.*
Lower spikes filiform-stalked, pistillate, the upper staminate; styles 3. 2. *C. bermudiana.*

1. Carex albolutéscens Schwein. GREENISH-WHITE SEDGE. (Fig. 84.) Culms 1°–2° tall, stout. Leaves 1″–2″ wide, shorter than the culm; bracts filiform or wanting; spikes 3–8, oblong, usually narrowed at both ends, silvery green when young, becoming brownish, 4″–6″ long, clustered; perigynia broadly ovate, not twice as long as wide, broadly winged, strongly nerved on both faces, about 2″ long, the roughish beak about one third as long as the body; scales lanceolate, acuminate; achene nearly or quite sessile.

Marshes and grassy fields. Native. Eastern United States. Flowers in spring.





2. Carex bermudiàna Hemsley. BERMUDA SEDGE. (Fig. 85.) Rootstock stout, short; culms rather stout, smooth, sharply 3-angled, nearly erect, 1½°–2½° tall. Leaves glabrous, roughish-margined, about 2″ wide, the lower often as long as the culm; spikes 5–8, linear, 1′–2′ long, densely many-flowered, the upper 1–4 staminate, at least at the summit, the lower 2–4 mostly all pistillate, the lowest filiform-stalked, the others sessile or nearly so; scales ovate, greenish-white, aristate, glabrous, longer than the perigynia or the upper about equalling them; perigynia glabrous, oblong, strongly ribbed, the short beak 2-cleft; styles 3; achene short stalked.

Wooded marshy situations and shaded rocky places. Very rare and presumably on the verge of extinction. Endemic. Flowers in spring.

First collected by J. Dickinson about 1699, the specimen preserved in the Sloane Herbarium at the British Museum of Natural History and not again collected by botanists until found by us in the autumn of 1905. Its nearest relative is *Carex Walteriana* Bailey of the southeastern United States, and the [illegible] have sprung from seeds of that species transported to Bermuda by [illegible]. Its affinity with *Carex praealta* Boott, of St. Helena, suggested by Hemsley, is [illegible] more remote; it was illustrated by Mr. Hemsley in "Journal of Botany" 21, pl. [illegible], *fig.* 2, and his original description and discussion of the plant may be found on p. [illegible] of the same volume.

Order 5. ARECALES.

Shrubs or trees, with erect or horizontal stems (caudices), growing by a single terminal bud. Leaves at the end of the stem, the petioles with imbricated bases; blades plaited in the bud, fan-shaped or pinnate. Flowers perfect or polygamous, in more or less compound axillary panicles. Perianth in 2 series of parts, persistent. Calyx of 3 [illegible]

nearly distinct sepals. Corolla of 3 partially united or distinct petals. Stamens mostly 6, sometimes 9–12; filaments dilated at the base and partially united; anthers introrse. Gynoecium of 3 more or less united or distinct carpels. Ovules solitary in each carpel, erect, orthotropous or anatropous. Fruit usually a drupe, sometimes a berry. Seeds often hollow. Endosperm horny or cartilaginous, rarely channelled.

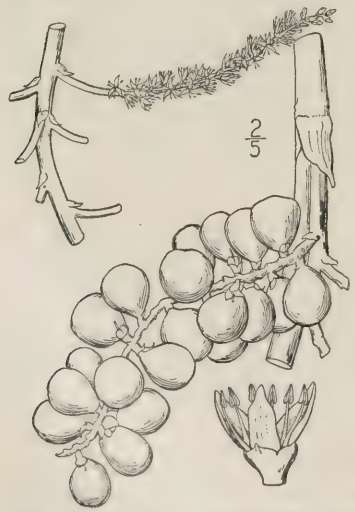
Family 1. **ARECÀCEAE** Reichenb.

PALM FAMILY.

Characters of the order. About 1200 species of palms are known; they are grouped in about 150 genera.

1. **SABÁL** Adans.

Unarmed palms. Leaves ample, fan-shaped, many-cleft, the segments 2-cleft, filamentose; ligule partially united to the rachis; petioles concave above, sharp-edged. Spadix decompound. Flowers perfect, sessile. Perianth white or green, glabrous. Calyx cup-shaped. Sepals 3, unequal. Petals 3, nearly distinct, imbricated. Stamens 6; filaments subulate or lanceolate, their dilated bases united and adnate to the corolla. Ovary 3-celled; style 3-angled; stigma truncate. Drupe usually developed from 1 carpel, with a membranous epicarp and a fleshy pericarp. Seed solitary, spheroidal, erect with a dark brown, shining testa. Endosperm horny. [Name not explained.] About 20 species, natives of warm-temperate and tropical America. Type species: *S. glabra* (Mill.) Sarg.



1. Sabal Blackburniànum Glazebrook. BERMUDA PALMETTO. (Fig. 86.) Trunk cylindric, up to 35° high, averaging 10′ in diameter, often variously constricted, that of young trees invested by the overlapping petiole-bases, but old trees mostly naked up to the crown of leaves. Young leaves scurfy on the veins beneath; old leaves bright green on both sides, averaging about 6° broad, but those of young trees often 9° broad, cleft at base and apex $\frac{5}{8}$ to $\frac{7}{8}$ and at the middle $\frac{1}{2}$ to $\frac{3}{4}$ toward the midrib which is convex and marginally 2-winged below and sharply 1-ridged above; leaf-segments 1′–2′ broad, 2-cleft toward the apex; there is usually a fibril at each primary and secondary cleft of the leaves; ligule narrowly triangular, 2′–4′ long, acute, with winged margins; petioles as long as the blades or somewhat longer, convex beneath, channeled above, much broader, and finally splitting at the base, fibrous-reticulate, margined below; inflorescence branched, longer than the petiole; flowers white; drupe black, obovoid, $\frac{1}{2}$′–$\frac{3}{4}$′ long. [*Sabal Palmetto* of Rein, Jones, Lefroy and H. B. Small; *S. umbraculifera* of Reade and of H. B. Small; *S. Adansonii* of Lefroy, of H. B. Small and of A. H. Moore; *Chamaerops Palmetto* of Michaux; *C. glabra* of Jones; *Inodes Blackburniana* Cook; *Sabal Mocini* Riccobono.]

Common in all but saline situations. Endemic. Flowers in summer, the fruit ripe in autumn. The plants differ greatly in size, depending on soil and situation, but there is only one species of Palmetto wild in Bermuda, records of two or more species notwithstanding. After the Cedar it is the most conspicuous native tree. [illegible] was first named as distinct from all others, in 1829, by Glazebrook, in the London Gardeners' Magazine **5**: 54, and there illustrated; the specific name is in honor of a Mr. Blackburn, in whose collection, in England, it was then known, but all record of its origin had been lost, other than that it came into the possession of his grandfather in 1737. It is now frequent in greenhouses in Europe, and occasional in West Indian gardens. Its closest relative is probably *Sabal Palmetto* (Walt.) Lodd., of Florida, the Bahamas and Cuba, from the seeds of which, brought to Bermuda by floating, it may have sprung through isolation. Baskets of many kinds, hats, dish-mats, napkin-rings, fans and other small articles are made from the bleached leaves; the leaves are also torn into strips and extensively utilized for stringing fish. Where growing protected from the wind, the trees hold their old withering leaves for some time, but ordinarily the leaves fall soon after maturing.

An intoxicating beverage called "Bibey" was formerly distilled from its fruit (H. B. Small).

It has often been illustrated, as on *plates 6, 7, 8 and 9* of the Botany of the Challenger Expedition; Garden and Forest **4**: *f. 53*; Annual Report, Missouri Botanical Garden **15**: *pl. 21*; Journal of the New York Botanical Garden, **13**: *pl. 107*. Constrictions in the trunk of this palm are described by Harshberger in Proceedings of the Academy of Natural Sciences of Philadelphia, **57**: 701-704, 1905.

Cocos nucífera L., COCONUT, tropical American, has been locally planted and grows to maturity. This palm succeeds best in loose sandy soil where its roots have perfect drainage. Its fruit, as produced in Bermuda, is mostly small, and not of good quality.

Phoenix dactylífera L., DATE PALM, African, has been locally planted for ornament and interest and grows well; a number of large trees may be seen, but the climate is neither dry nor hot enough to enable it to perfect very good fruit. Fine old plants were seen at the Public Garden, St. Georges.

Phoenix rupícola T. Anders., a low, bright green species, is grown in gardens; it is native of India.

Roystonea régia (H.B.K.) Cook, ROYAL PALM, Cuban and Floridian, commonly planted for shade and ornament, and of rapid growth, has pinnate leaves often 9° long or longer, their narrow segments spreading in more than one plane, long drooping panicles of white flowers, and subglobose, slightly fleshy fruits about 4″ long. [*Oreodoxa regia* H.B.K.]

Roystonea oleràcea (Jacq.) Cook, CABBAGE PALM, Jamaican, is similar to the preceding species but taller, sometimes 90° high, the leaf-segments spreading nearly in one plane, the oblong slightly curved fruit nearly 1′ long. [*Oreodoxa oleracea* (Jacq.) Mart.]

Livistona chinènsis R. Br., BOURBON PALM, a fan leaved species with spiny leaf-stalks and very large leaves is commonly grown in gardens, forming a trunk up to 12° high or more. [*L. mauritiana* Wall.]

Acrocomia aculeàta (Jacq.) Cook, GRUGRU PALM, West Indian, may be seen in several fine specimens on lawns; it has pinnate spiny leaves and a cylindric stout densely spiny trunk up to 20° high. It has been erroneously recorded as an *Astrocaryum*.

Chrysalidocarpus lutéscens H. Wendl., GOLDEN-FRUITED PALM, native of Madagascar, a species usually forming clustered trunks, slender and becoming 15° or 20° high, with light green, long, pinnate leaves and small yellow fruit, is occasionally planted for ornament.

Rhapis flabelliformis L'Her., of Western Asia, occasionally planted for ornament, is a very slender palm, 9° high or less, forming thickets; its slender petioled palmate leaves are about 1° broad, cleft nearly to the end of the petiole into 3-10 linear segments ½′-1′ wide, which are incised at the apex and with spinulose margins; its flowers are in panicles of spikes on the leaves.

Caryota úrens L., TODDY PALM, WINE PALM, Asiatic, [illegible] at the Agricultural Station in 1913, but not vigorous, [illegible] favorable conditions; it is unarmed, with pinnately divided leaves [illegible] or 12° long, the segments obliquely wedge-shaped and toothed [illegible]

develops large drooping flower-clusters at the upper axils and progressively downward nearly to the base.

Areca Catèchu L., BETEL NUT, Asiatic, occasionally planted, is an unarmed palm with a slender trunk, becoming 40° high or higher, its pinnate leaves 4°–6° long, with many, narrowly lanceolate, plicate segments; its inflorescence is much-branched, drooping, with small white flowers, its ovoid, smooth, orange or scarlet fruit about 2′ long, used in large quantities in tropical Asia for chewing. The Agricultural Station had seedlings in 1914.

Coccothrinax argéntea (Lodd.) Sarg., SILVER THATCH PALM, Floridian and West Indian, a fan-leaved palm up to 20° high, the slender-petioled leaves silvery beneath, the petiole-bases fibrous-netted, the panicled, small, globose, fruits black, is occasionally planted for ornament.

Pinanga Kùhlii Blume, KUHL'S PINANGA, Malayan, was taken to Mt. Langton from the New York Botanical Garden in 1913. Seedling plants were also seen at the Agricultural Station. It is a pinnate-leaved palm, with long leaf-sheaths and acuminate, falcate segments, the upper ones cuneate at the base and incised at the apex; the fruits are small and ellipsoid.

Chamaerops hùmilis L., DWARF PALM, of southern Europe, a low, fan-leaved species with slender spiny petioles, linear leaf-segments, the dark green, orbicular leaves about 1° broad, the flowers in short, dense panicles, is occasionally planted for ornament.

Howea Belmoreàna (F. Muell.) Becc., CURLY PALM, from Lord Howe's Island in the Pacific Ocean, is occasionally planted, and often eroneously called Kentia. It becomes at least 20° tall, with great pinnate leaves 8°–12° long, their narrow long-acuminate segments 2°–3° long, about 7′ wide; the flowers are borne on greatly elongated, solitary or few spadices, the fruit partly enclosed in notches. [*Kentia Belmoreana* F. Muell.]

Rhopadostylis Baùeri H. Wendl., BAUER'S RHOPADOSTYLIS, native of Norfolk Island, is a pinnate-leaved palm, becoming 10° high or more, the leaves 6°–10° long, the tips of their numerous, narrow segments at first connected by a very slender marginal band which disappears as the leaves become older; it has white flowers and small, scarlet, short-ellipsoid fruits. A fine specimen, apparently this species, was seen at Norwood in 1914.

Neowashingtonia filìfera (Linden) Sudw., WEEPING PALM, of Lower California, taken to Mt. Langton from the New York Botanical Garden in 1913, has fan-shaped leaves 2°–4° broad on slender, unarmed petioles, the numerous linear segments with marginal filaments; the inflorescence of this palm is paniculately branched, with small white flowers. [*Washingtonia filifera* Linden.]

Dictyosperma àlbum (Bory) Wendl. & Drude, WHITE DICTYOSPERMA, of the Mascarene Islands, seen at Bellevue in 1914, is a pinnate-leaved palm, with short-petioled, stiff leaves 6° long or more, short panicles of small, white flowers, the narrowly ovoid pointed fruits nearly ½′ long. I am indebted to Mr. O. F. Cook, of the United States Department of Agriculture, for the identification of this species. [*Areca alba* Bory.]

Dictyosperma rùbrum Wendl. & Drude, East Indian, was represented by seedlings at the Agricultural Station in 1914.

Ptychosperma élegans (R. Br.) Blume, ELEGANT PTYCHOSPERMA, Australian, is a pinnate-leaved palm, similar to the preceding species, but with longer panicles. One of the palms in the collection seen at Bellevue in 1914, is probably referable to this species. [*Seaforthia elegans* R. Br.]

Martinezia caryotaefòlia H.B.K., MARTINEZIA, South American, recorded by Jones in 1873, is a tall slender palm, with a spiny trunk, the pinnate leaves 3°–6° long also spiny, their segments wedge-shaped, clustered.

Seedling palms, under the following names, were seen at the Agricultural Station in 1914:

Pritchardia pacífica Seem. & Wendl., Samoan; this species is recorded by Jones as grown in Bermuda in 1873.

Pritchardia Thùrstoni Muell. & Drude, Fijian.

Oncosperma fasciculàtum Thwaites, Ceylonese.

Licuala grándis (Bull) Wendl., of New Britain.

Martinezia corollìna Mart. of Martinique.

Livistona Hoogendòrfii André, Javan.

Dypsis madagascariènsis Nicholson, Madagascan.

Order 6. CYCLANTHÀLES.

Herbs, shrubs or some species woody vines, with petioled flabellate leaves and monoecious flowers in axillary, peduncled, fleshy, spadix-like spikes, the perianth wanting or rudimentary. Staminate flowers with many stamens, the anthers linear to oval. Pistillate flowers usually with 4 staminodes; ovary 1-celled, truncate or 4-lobed; stigmas 1 or 4; ovules many. Fruit a fleshy syncarp. The order is composed of a single family.

Family 1. CYCLANTHÀCEAE.

CYCLANTHUS FAMILY.

Six genera and about 40 species, natives of tropical America.

Carludòvica palmàta R. & P., PANAMA-HAT PLANT, Peruvian, grown for ornament, has long-petioled dark-green leaves 2°–3° broad, cleft into linear, acuminate spreading and drooping segments. From the petioles the fibre is obtained for weaving hats of fine quality, and in 1903 the Botanical Station had some 7000 plants for distribution raised from seed, but the industry was not established.

Order 7. ARÀLES.

Monocotyledonous herbs, mostly fleshy. Inflorescence in the *Araceae* a fleshy spadix, subtended by a spathe, or naked. The *Lemnaceae* are minute floating thalloid plants, with few or solitary flowers on the margin or back of the thallus.

Large terrestrial plants, the inflorescence a spadix.	Fam. 1 ARACEAE.
Minute floating thalloid plants with few or solitary flowers.	Fam. 2 LEMNACEAE.

Family 1. ARÀCEAE Neck.

ARUM FAMILY.

Herbs mostly with basal long petioled leaves, and spathaceous inflorescence, the spathe enclosing or subtending a spadix. Rootstock tuberous or a corm. Spadix densely flowered, the staminate flowers above, the pistillate below, or the plants wholly dioecious, or with perfect flowers in some species. Perianth wanting, or of 4–6 scale-like segments. Stamens 2–10. Filaments very short; anthers 2-celled, commonly with a thick truncate connective, the sacs opening by dorsal pores or slits. Ovary 1-several-celled; ovules 1-several in each cavity; style short or wanting; stigma terminal, mostly minute and sessile. Fruit a berry or utricle. Seeds various. Endosperm copious, sparse or none. About 105 genera and at least 1000 species, mostly of tropical regions, a few in the temperate zones.

1. ZANTEDÈSCHIA Spreng.

Succulent glabrous herbs with thick rootstocks and sagittate or hastate long-petioled leaves, showy white or yellow spathes, the monoecious flowers on a stout spadix; staminate flowers uppermost, with 2 or 3 stamens; pistillate flowers with 3 spatulate staminodes, an ovoid ovary, a very short style and a discoid stigma. Berries 1–5-celled, 2–10-seeded. [Dedicated to Francesco Zandeschi.] About 6 South African species, the following typical.



1. Zantedeschia aethiòpica (L.) Spreng. CALLA LILY. (Fig. 87.) Leaves sagittate, ovate to ovate-lanceolate, acute, bright green, 2° high or more, apiculate; peduncle stout, as long as the leaves or shorter; spathe bright white, 5′–7′ long, yellowish within below, narrow-tipped; pistillate part of the spadix about one fourth as long as the yellow staminate portion; berries yellow. [*Calla aethiopica* L.; *Richardia africana* Kunth.]

Quite abundantly naturalized in fresh-water marshes. Escaped from cultivation. Native of Africa. Flowers in summer and autumn.

Anthurium Veitchii Masters, VEITCH'S TAIL-FLOWER, Colombian, seen at Paget Rectory in 1914, has large, lanceolate, recurving, petioled leaves often 5° long, arising in tufts from thick rootstocks, their veins impressed; the thick yellowish spadix is about 8′ long, the green spathe about 1° long.

Dieffenbachia seguìne (Jacq.) Schott, DUMB CANE, West Indian, recorded by Lefroy as grown at Mt. Langton, has erect stems 3°–5° high, the ovate, petioled leaves 8′–15′ long, clustered toward the top; the narrow spathes are 5′–7′ long. [*Arum seguine* Jacq.]

Arisaema triphỳllum (L.) Blume, JACK-IN-THE-PULPIT, North American, was recently planted in a garden near Bailey's Bay, but did not become established. It has acrid corms, and long-petioled, 3-foliolate leaves. [*Arum triphyllum* L.]

Caladium bícolor (Ait.) Vent., CALADIUM, South American, grown for ornament, is stemless, with long-petioled, ovate, peltate, sagittate, pointed, often variegated leaves. [*Arum bicolor* Ait.]

Xanthosoma sagittaefòlium (L.) Schott, YAUTIA, MALANGA, of tropical America, sometimes grown for its edible tubers, is stemless or nearly so, with long-petioled, sagittate leaves 1°–3° long. [*Arum sagittaefolium* L.]

Xanthosoma violàceum Schott., VIOLET XANTHOSOMA, West Indian, has ovate, sagittate leaves with violet petioles about twice as long as the blades, its spathe pale violet; it is occasionally planted for ornament.

Colocasia esculénta (L.) Schott, EDDOE-COCO, ELEPHANT'S EARS, a low stemless species with large long-petioled cordate leaves, is cultivated for its edible tubers. It is native of the East Indies. [*Arum esculentum* L.]

Monstera deliciòsa Liebm., a vine with large ovate perforated leaves often grown on walls for ornament and for its cylindric edible fruit. [*Philodendron lacerum* of H. B. Small.]

Philodendron gigantèum Schott, West Indian, a very large-leaved, half-climbing species, existed in the Victoria Park, Hamilton, 1912.

A species of *Philodendron*, climbing to a height of 8', with cordate, ovate, short-acuminate, yellow-mottled leaves about 1' long, was seen at Orange Valley in 1914.

Several other species of this family are grown in gardens as ornamentals.

Family 2. **LEMNÀCEAE** Dumort.

DUCKWEED FAMILY.

Minute perennial floating aquatic plants, without leaves or with only very rudimentary ones. The plant-body consists of a disk-shaped, elongated or irregular thallus, which is loosely cellular, densely chlorophyllous and sometimes bears one or more roots. The vegetative growth is by lateral branching, the branches being but slightly connected by slender stalks and soon separating. The inflorescence consists of one or more naked monoecious flowers borne on a slight lateral prominence on the edge or upper surface of the plant. Each flower commonly consists of but a single stamen or a single flask-shaped pistil. The anther is provided with two to four pollen-sacs, containing spherical minutely barbellate grains. The pistil is narrowed to the funnel-shaped scar-like stigmatic apex, and produces 1–6 erect or inverted ovules. The fruit is a 1–6-seeded utricle. The family comprises the smallest of the flowering plants and contains 4 genera and about 30 species of wide distribution.

1. **LÉMNA** L.

Thallus disk-shaped, usually provided with a central nerve and with or without two or four lateral nerves. Each thallus produces a single root, which is devoid of vascular tissue and is commonly provided with a thin blunt or pointed rootcap. The ovary contains from one to six ovules. Fruit ovoid, more or less ribbed. Endosperm in one or three layers. [Greek, in allusion to the growth of these small plants in swamps.] About 8 species, in temperate and tropical regions. Type species: *Lemna trisulca* L.

1. Lemna cyclostàsa (Ell.) Chev. VALDIVIA DUCKWEED. (Fig. 88.) Thallus oblong-elliptic, 1″–2½″ long, thin, subfalcate and shortly stalked at the base, provided with numerous stomata, except on the borders, nerveless; rootcap blunt; spathe reniform; fruit ovoid-oblong, unsymmetrical; seed prominently 12–29-ribbed. [*L. minor cyclostasa* Ell.; *L. valdiviana* Phil.; *L. minor* of Rein, Reade, Lefroy, Moore and Harshberger.]



Common in ditches and marshes, often covering the surface of water. Native United States, West Indies and tropical continental America. Its minute flowers are seldom observed. Probably transported to Bermuda on the feet or feathers of birds.

Lemna trisúlca L., of the cooler parts of the north temperate zone, is recorded as Bermudian by Rein and copied by Hemsley, but it has not been found by recent collectors, and probably could not withstand the warm climate. The plant described under that name by H. B. Small is *Salvinia Olfersiana.*

Order 8. XYRIDÀLES.

Monocotyledonous herbs, mostly with narrow leaves. Flowers usually complete, their parts mostly in 3's or 6's. Corolla regular or nearly so (except in *Commelina*). Ovary compound, superior. Endosperm of the seed mealy.

Plants not epiphytic; leaves not scurfy.	
Perianth of 2 series of parts, the outer (sepals) green, the inner (petals) colored.	Fam. 1. COMMELINACEAE.
Perianth 6-parted.	Fam. 2. PONTEDERIACEAE.
Plants epiphytic; leaves scurfy.	Fam. 3. BROMELIACEAE.

Family 1. COMMELINÀCEAE Reichenb.

SPIDERWORT FAMILY.

Perennial or annual leafy herbs with regular or irregular perfect and often showy flowers in cymes, commonly subtended by spathe-like or leafy bracts. Perianth of 2 series; a calyx of mostly 3 persistent sepals and a corolla of mostly 3 membranous and deciduous or fugacious petals. Stamens mostly 6, hypogynous, rarely fewer, all similar and perfect or 2 or 3 of them different from the others and sterile; filaments filiform or somewhat flattened; anthers 2-celled, mostly longitudinally dehiscent. Ovary superior, sessile or very nearly so, 2–3-celled; ovules 1 or several in each cell, anatropous or half anatropous; style simple; stigmas terminal, entire or obscurely 2–3-lobed. Seeds solitary or several in each cell of the capsule. Capsule 2–3-celled, loculicidally 2–3-valved. Embryo small. Endosperm copious. About 25 genera and 350 species, mostly natives of tropical regions, a few in the temperate zones.

Fertile stamens 2 or 3.	1. *Commelina.*
Fertile stamens 6.	2. *Zebrina.*

1. COMMELÌNA L.

Somewhat succulent, branching herbs, with short-petioled or sessile leaves, and irregular mostly blue flowers in sessile cymes subtended by spathe-like bracts. Sepals unequal, the larger ones sometimes slightly united. Petals unequal, 2 of them larger than the third. Perfect stamens 3, rarely 2, one of them incurved and its anther commonly larger. Sterile stamens usually 3, smaller, their anthers various. Filaments all glabrous. Capsule 3-celled. Seeds 1 or 2 in each cavity, the testa roughened, smooth or reticulated. [Dedicated to Kaspar Commelin, 1667–1731, Dutch botanist.] About 95 species of wide distribution in warm and temperate regions. Type species: *Commelina communis* L.

Spathes not united, acuminate.	1. *C. longicaulis.*
Spathes united toward the base, acute.	2. *C. elegans.*

1. Commelina longicaùlis Jacq. CREEPING DAY-FLOWER. CHICKEN-GRASS. POULTRY-GRASS. (Fig. 89.) Glabrous or very nearly so; stems procumbent or creeping, 1°–3° long. Leaves lanceolate or ovate-lanceolate, 1′–3′ long, acute or acuminate at the apex, their sheaths sometimes ciliate; spathe acuminate, ¾′–1½′ long, peduncled, the 2 bracts not united by their margins; flowers few in each spathe, 3″–6″ broad; ventral cavities of the ovary 2-ovuled, the dorsal 1-ovuled; capsule commonly 5-seeded (2 seeds in each of the ventral cells, 1 in the dorsal); seeds oblong, reticulated, about 1″ long. [*C. agraria* Kunth; *C. communis* of Jones; *C. nudiflora* of Clarke, not of Linnaeus.]

Common in moist or wet shaded situations. Native. Southeastern United States, West Indies and tropical continental America. Flowers nearly throughout the year. Its seeds perhaps transported by birds.





2. Commelina élegans H.B.K. LARGER DAY-FLOWER. [Fig. 90.] Stems branching at the base, the branches decumbent, rooting at the nodes, pubescent at least below the nodes; leaves lanceolate to elliptic or oblong-lanceolate, 1′–4′ long, acute or acuminate at the apex, often rounded at the base, the sheaths naked or sparingly ciliate on the margin; spathes short-peduncled, pubescent, 7″–10″ long, acute; petals blue or white; capsules broadly obovoid, 2″ long; seeds 3, about 1½″ long, slightly flattened, smooth. This species has been referred by authors to *C. virginica* L.

Frequent in waste and cultivated grounds. Naturalized. Native of Florida, West Indies and tropical continental America. Flowers from spring to autumn.

2. ZEBRINA Schnitzl.

A succulent, [illegible] or procumbent, perennial herb, with ovate sessile leaves, and few subsessile small clustered flowers. Sepals connate into a cylindric tube, persistent. Petals also connate below, with spreading limbs. Stamens 6, equal, perfect. Ovary [illegible] with 2 ovules. Capsule 3-celled, with 1 or 2 seeds in each cavity. [Leaves [illegible] striped leaves.] A monotypic genus.



1. Zebrina péndula Schnitzl. WANDERING JEW. (Fig. 91.) Stems 1° long or more, branched. Leaves 1′–2′ long, acute or acuminate, purple beneath, longitudinally green- or white-banded above, their sheaths ciliate at the throat; flowers glomerate between 2 upper leaves; calyx-tube white; corolla-tube white; limbs of the petals ovate, rose-purple. [*Tradescantia discolor* of H. B. Small.]

Locally escaped from gardens, where it is commonly planted for ornament and is very luxuriant. Flowers nearly throughout the year. Native of the West Indies and Central America.

Rhoeo díscolor (L'Her.) Hance, OYSTER PLANT, West Indian, a nearly stemless succulent plant, with large imbricated lanceolate purplish leaves, the short-peduncled clustered flowers subtended by large ovate concave bracts, is occasional in gardens. [*Tradescantia discolor* L'Her.; *Cyanotis discolor* of Jones.]

Tradescantia virgìnica L., BLUE SPIDERWORT, North American, with linear leaves and showy blue umbellate flowers is another garden plant of this family.

Family 2. **PONTEDERIÀCEAE** Dumort.

PICKEREL-WEED FAMILY.

Perennial aquatic or bog plants, the leaves petioled, with thick blades, or long and grass-like. Flowers perfect, more or less irregular, solitary or spiked, subtended by leaf-like spathes. Perianth free from the ovary, corolla-like, 6-parted. Stamens 3 or 6, inserted on the tube or the base of the perianth; filaments filiform, dilated at the base or thickened at the middle; anthers 2-celled, linear-oblong or rarely ovate. Ovary 3-celled with axile placentae, or 1-celled with 3 parietal placentae; style filiform or columnar; stigma terminal, entire or minutely toothed; ovules anatropous, numerous, sometimes only 1 of them perfecting. Fruit a many-seeded capsule, or a 1-celled, 1-seeded utricle. Endosperm of the seed copious, mealy; embryo central, cylindric. About 5 genera and 25 species, in temperate and tropical regions.

1. **PIARÓPUS** Raf.

Herbs, with floating rootstocks copiously root-bearing at the nodes, the leaves clustered at the nodes, the petioles slender or inflated, the blades commonly dilated. Flowers sessile, solitary, or in terminal spikes or racemes. Perianth showy, its 6 parts in 2 series, united into a tube below, the limb oblique. Stamens 6, irregularly adnate to the perianth, 3 included, 3 exserted; filaments sometimes flattened at the base. Ovary 3-celled; stigma terminal; ovules numerous. Capsule included in the withering-persistent perianth, loculicidal. Seeds many-ribbed. [Greek, referring to the swollen petiole of the following species.] About 5 species, natives of tropical America. Type species: *Pontederia azurea* Sw.

1. Piaropus crássipes (Mart.) Britton. WATER HYACINTH. (Fig. 92.) Floating or rooting in the mud. Foliage glabrous below; leaves erect, or ascending; petioles elongated, wholly or partly inflated or sometimes gradually tapering from the base; blades 1½′–3½′ broad, ovate to orbicular or nearly reniform, leathery; scapes 4′–16′ tall, simple; spadix glandular-pubescent; perianth showy, bluish purple; tube curved, about 1′ long; lobes suborbicular or obovate, longer than the tube, the upper one with a yellow center. [*Pontederia crassipes* Mart.; *Eichornia crassipes* Solms; *Pontederia azurea* of H. B. Small.]



In water, Devonshire and Pembroke Marshes, multiplying so rapidly that it chokes outlets and has to be removed at intervals. Introduced. Native of the West Indies and tropical continental America. Completely naturalized in Florida, where it chokes streams and rivers, impeding navigation. Flowers in summer and autumn.

Family 3. BROMELIÀCEAE J. St. Hil.

PINE-APPLE FAMILY.

Epiphytic herbs (some species terrestrial or on rocks), mostly scurfy, with elongated, entire or spinulose-serrate leaves. Flowers spiked, panicled, or solitary, regular and perfect, usually conspicuously bracted. Perianth of 3 thin distinct or somewhat united sepals, and 3 clawed distinct or united petals. Stamens 6, usually inserted on the base of the corolla. Ovary inferior or superior, 3-celled; ovules numerous in each cavity, anatropous; style short or elongated; stigmas 3. Capsule 3-valved in our species. Seeds numerous, the testa membranous. Embryo small, situated at the base of the copious endosperm. About 35 genera and 900 species, all natives of tropical and subtropical America.

No species of the family is native or naturalized.

Dendropogon usneoìdes (L.) Raf. [*Tillandsia usneoides* L.], LONG MOSS, FLORIDA MOSS, SPANISH MOSS, of the southeastern United States and West Indies, a much-branched, grey-green, scurfy plant with drooping, thread-like stems, filiform leaves and small axillary flowers with linear-spatulate petals, has been introduced for interest and grown on trees and porches, in places appearing almost naturalized.

Guzmania lingulàta (L.) Mez., CRIMSON GUZMANIA, of tropical America, growing naturally on rocks and trees, is a stout-stemmed plant about 1° high, with tufted, linear, pointed leaves 1° long or less, about 1′ wide, the yellowish flowers in a terminal dense head subtended by foliaceous red bracts, the capsular fruits narrowly oblong, containing many seeds provided with brown wool.

it was seen growing on rock work at Bellevue in 1913. [*Caraguata lingulata* Lindl.]

Ananas Anànas (L.) Cockerell, PINE APPLE, presumably of South American origin, now occasionally grown, but of no commercial importance in Bermuda, is recorded as introduced from the West Indies in 1616, and was, apparently, quite extensively grown for a good many years. [*Bromelia Ananas* L.; *Ananas sativa* Mill.]

Tillandsia fasciculàta Sw., FASCICLED TILLANDSIA, West Indian, occasionally grown on rock work and in greenhouses, has large tufts of grey-green linear-lanceolate leaves about 1° long and blue flowers in bracted, fascicled spikes at the top of a stem 1°–2° long.

Aechmaea polystàchya (Vell.) Mez, VIOLET AECHMAEA, South American, occasionally planted for ornament and interest, has linear-lanceolate, acuminate, spinulose-serrate leaves 1°–2° long and about 1′ wide above the much wider base, the many-flowered, erect scape somewhat longer than the leaves, the flowers in panicled, flattened erect spikes, the corolla violet-blue. [*Tillandsia polystachya* Vell.]

Dyckia altìssima Lindl., TALL DYCKIA, Brazilian, was sent to Paget Rectory from the New York Botanical Garden in 1914.

Order 9. LILIÀLES.

Monocotyledonous plants, mostly with well-developed perianth, the flowers usually regular and complete, and their parts in 3's or 6's. Ovary superior or inferior, compound. Endosperm of the seed fleshy or horny.

Ovary superior.
- Perianth-segments distinct, green or brown, not petal-like; herbs with grass-like leaves and small flowers. — Fam. 1. JUNCACEAE.
- Perianth-segments distinct, or partly united, at least the inner petal-like.
  - Herbaceous plants or vines.
    - Fruit a capsule. — Fam. 2. LILIACEAE.
    - Fruit a fleshy berry.
      - Erect herbs or vines; tendrils none; flowers perfect. — Fam. 3. CONVALLARIACEAE.
      - Vines, climbing by tendrils, or rarely erect; flowers dioecious, in axillary umbels. — Fam. 4. SMILACEAE.
  - Large tall woody plants. — Fam. 5. DRACAENACEAE.

Ovary inferior, wholly or in part.
- Stamens 6 in our species.
  - Erect perennial herbs; flowers perfect. — Fam. 6. AMARYLLIDACEAE.
  - Twining vines; flowers dioecious. — Fam. 7. DIOSCOREACEAE.
- Stamens 3, opposite the outer corolla-segments. — Fam. 8. IRIDACEAE.

Family 1. JUNCÀCEAE Vent.

RUSH FAMILY.

Perennial or sometimes annual, grass-like, usually tufted herbs, commonly growing in moist places. Inflorescence usually compound or decompound, paniculate, corymbose, cymose, or umbelloid, rarely reduced to a single flower, bearing its flowers singly, or loosely clustered, or aggregated into spikes or heads. Flowers small, regular, with or without bractlets (prophylla). Perianth 6-parted, the parts glumaceous. Stamens 3 or 6, rarely 4 or 5, the anthers adnate, introrse, 2-celled, dehiscing by a slit.

Pistil superior, tricarpous, 1-celled or 3-celled, with 3–many ascending anatropous ovules, and 3 filiform stigmas. Fruit a loculicidal capsule. Seeds 3–many, small, cylindric to subglobose, with loose or close seed-coat, with or without caruncular or tail-like appendages. Seven genera and about 200 species, widely distributed.

1. JUNCUS L.

Usually perennial plants, principally of swamp habitat, with glabrous herbage; stems leaf-bearing or scapose, leaf-sheaths with free margins, and leaf-blades terete, gladiate, grass-like, or channeled. Inflorescence paniculate or corymbose, often unilateral, sometimes congested, bearing its flowers either singly and with 2 bractlets (prophylla), or in heads and without bractlets, but each in the axil of a bract; bractlets almost always entire; stamens 6 or 3; ovary 1-celled or by the intrusion of the placentae 3-celled, the placentae correspondingly parietal or axial; seeds several–many, usually distinctly reticulated or ribbed, often tailed. About 215 species, most abundant in the north temperate zone. The plants bloom in summer. [Latin, from *jungo*, to bind, in allusion to the use of these plants for withes.] Type species: *Juncus acutus* L.

Leaf-blades terete; tall perennials.
  Inner perianth-segments obtuse; capsule ovoid. 1. *J. acutus.*
  Perianth-segments acute; capsule oblong. 2. *J. maritimus.*
Leaf-blades flat.
  Annual; low; flowers solitary on the branches of the inflorescence. 3. *J. bufonius.*
  Perennial; tall; flowers in paniculed heads. 4. *J. aristulatus.*

1. Juncus acùtus L. LARGE MARSH RUSH. (Fig. 93.) Stems stout, 2½°–3½° high, from stout rootstocks. Basal leaves several, stout, stiff, often as long as the stem, pungently tipped, terete; leaves of the inflorescence stout, erect, tipped like the basal ones, as long as the panicle or shorter, or sometimes exceeding it; panicle 3′–9′ long, its stiff branches nearly erect; heads few-flowered; perianth about 2″ long, its outer segments lanceolate, the inner oval-oblong, obtuse; stamens 6, shorter than the perianth; capsule about 3½″ long, ovoid, tipped, about twice as long as the perianth; seeds tailed at each end, oblong.

Camden Marsh; Coney Island; St. George's Island. Naturalized. Coasts of southwestern Europe and the Mediterranean region; southern and lower California.





2. **Juncus marítimus** Lam. Sea Rush. (Fig. 94.) Stems 3° high or less, from a stout horizontal rootstock. Outer basal leaves reduced to bladeless sheaths, the innermost with a long terete stout blade about equalling the stem; leaf of the inflorescence erect, sometimes 1° long; panicle 3′–8′ high, its branches stiff, erect; heads 2–6-flowered; perianth 1½″ long, its parts green, lanceolate, with hyaline margins; flowers perfect; stamens 6, two thirds as long as the perianth; filaments about as long as the anthers; capsule 1½″ long, narrowly oblong, acute, mucronate, brown above, 3-celled; seed brown, the body narrowly and obliquely oblong, tailed at either end.

Salt marshes, uncommon, but locally forming large colonies, especially at Spittle Pond. Native. Europe, and very locally on the coast of the eastern United States. Probably transported to Bermuda by floating.

3. **Juncus bufónius** L. Toad Rush. (Fig. 95.) Plant branching from the base, annual, erect, seldom exceeding 8′ in height; leaf-blades flat, ¼″–½″ wide, in low plants often much narrower; inflorescence with blade-bearing leaves at the lower nodes; flowers inserted singly on its branches; perianth-parts 2″–3½″ long, lanceolate, acuminate, equal; stamens usually 6, sometimes 3; anthers shorter than the filaments; capsule about two thirds as long as the perianth, narrowly oblong, obtuse, mucronate, 3-celled; seeds broadly oblong, with straight tips, minutely reticulate in 30–40 longitudinal rows.

Pembroke Marsh, and in cultivated ground, Harrington House, 1909. Naturalized. Native of the north temperate zone. Flowers in spring.



Juncus ténuis Willd., Slender Rush, a similar perennial North American species, recorded as Bermudian by Rein, Reade, Lefroy and H. B. Small, has not been found by recent collectors. Reade states that it occurs in the marshes. A specimen of a *Juncus* collected by Rein but not named by him proves to be *J. bufonius*, and all Bermudian references to *J. tenuis* are probable errors for *J. bufonius*.

4. Juncus aristulàtus Michx. LARGE GRASS-LEAVED RUSH. (Fig. 96.) Plants solitary or sparingly tufted, 2°–4° high or sometimes lower. Stems markedly bulbous-thickened at the base; leaves sometimes 2½″ broad; panicle 10′ high or less, composed of numerous, usually 20–100 relatively small 2–5-flowered heads; perianth about 1¼″ long; sepals acute or acuminate; petals oblong or obovate, obtuse, longer than the sepals; stamens as long as the perianth or longer; anthers much shorter than the filaments; capsules obovoid, about 1″ long, truncate or depressed at the apex.

Frequent in marshes. Native. Eastern United States, Cuba, Mexico. Flowers from spring to autumn. Its seeds presumably transported to Bermuda by winds.



Family 2. **LILIÀCEAE** Adans.

LILY FAMILY.

Scapose or leafy-stemmed herbs from bulbs or corms, or rarely with rootstocks, the leaves various. Flowers solitary or clustered, regular, mostly perfect. Perianth parted into 6 distinct or nearly distinct segments, or these more or less united into a tube, inferior or partly superior. Stamens 6, hypogynous or borne on the perianth or at the bases of its segments; anthers 2-celled, mostly introrse, sometimes extrorse. Ovary 3-celled; ovules few or numerous in each cavity, anatropous or amphitropous; styles united; stigma 3-lobed or capitate. Fruit a loculicidal capsule. Seeds various, winged or wingless. Embryo in copious endosperm. About 125 genera and 1300 species, widely distributed. Many showy-flowered plants are members of this family, and favorites for cultivation.

Bulbous plants with umbellate flowers and linear leaves; perianth-segments scarcely united ..... 1. ALLIUM.

Plants with a caudex, the flowers racemose, the thick leaves spiny-toothed, petioled, subcylindric ..... 2. YUCCA.

1. NOTHOSCÓRDUM Kunth.

Scapose herbs, similar to the onions, but without alliaceous odor, with membranous-coated bulbs, narrowly linear basal leaves and small yellow or yellowish-green flowers in an erect 2-bracted umbel. Perianth 6-parted, withering-persistent, its segments 1-nerved. Stamens 6, inserted on the bases of the perianth-segments; anther-sacs introrsely dehiscent. Ovary sessile, 3-celled; ovules several in each cavity; style filiform, jointed near the base, but commonly persistent; stigma small, capitate. Capsule 3-lobed, loculicidal. Seeds angled or flattish, black. [Greek, signifying false garlic.] About 10 species. Type species: *Northoscordum pulchellum* Kunth.



1. Nothoscordum fràgrans (Vent.) Kunth. LARGE FALSE GARLIC. (Fig. 97.) Bulb ovoid. Leaves 3″–8″ wide, flat; bracts ovate-acuminate, persistent; umbel 6–22-flowered; pedicels filiform, 1′–2′ long in fruit; flowers 5″–6″ long; perianth-segments thin, oblong, or oblong-spatulate, longer than the stamens; capsule obovoid, 3″–4″ high, the style as long or slightly shorter. [*Allium fragrans* Vent.]

Waste and cultivated grounds, Hamilton Parish and St. George's. Naturalized in the southern United States and Jamaica. Supposed to be native of Africa. Flowers in spring and summer. Known as "Wild Onion" in Bermuda, and, presumably, recorded by H. B. Small as *Allium sativum*. The plant differs from *N. bivalve* (L.) Britton with which it has sometimes been confused, by its usually broader leaves and its obovoid capsule; the capsule of *N. bivalve* is globose or depressed globose.

2. ALÒE L.

Succulent plants with a short or elongated caudex, the thick tufted leaves with spiny-toothed margins, the racemose flowers nodding. Perianth subcylindric, the segments connivent or coherent, their tips somewhat spreading. Stamens 6, with slender filaments and oblong anthers. Ovary sessile, 3-angled and 3-celled; style filiform, tipped by the small stigma; ovules many in each cavity of the ovary. Capsule leathery, loculicidally dehiscent. Seeds numerous, black. [Name ancient.] Over 75 species, mostly African, the following typical.

1. Aloe vèra L. ALOES. COMMON ALOES. (Fig. 98.) Acaulescent, or nearly so, stoloniferous. Leaves 1°–2° long, narrowly lanceolate, long-acuminate, turgid, very watery within, pale glaucous-green, the marginal spiny teeth ½′ apart or less; scape stout, 2°–3½° high, bearing distant, broad, acute scales; raceme dense, 4′–12′ long; bracts lanceolate, acute, longer than the short pedicels; flowers yellow, about 1′ long; stamens about as long as the perianth, the style longer. [*A. vulgaris* Lam.]



Waste grounds and woodlands. Escaped from cultivation and naturalized. Native of the Mediterranean region. Flowers in summer. Called BAMBOO, according to Lefroy.

Aloe soccotrina Lam., BITTER ALOES, is occasionally cultivated, as well as a few other African species, interesting as ornamentals. *Aloe lingua* Hook. is mentioned by Jones.

Medeola virgínica L., CUCUMBER ROOT, a North American plant of the related family Trilliaceae, with a whorl of 4 to 10 leaves under an umbel of small greenish flowers, is said, by Lefroy, to be "a small annual weed found under walls," but this appears to be an error in record or determination.

Allium Cèpa L., ONION, is one of the most important food-crops of the islands, and the bulbs are largely exported, although the industry is not nearly as extensive as it was some years ago. Lefroy states that over 4,000 tons were exported in 1875.

Lilium longiflòrum Thunb., EASTER LILY, WHITE JAPANESE LILY, is extensively grown for export in a race (*L. Harrisii* Carr.) sometimes said to have originated here, but this industry is not as important as it was some years ago, although the Lily fields are yet a very conspicuous feature in spring. The industry commenced about 1878 and reached its greatest development from 1890 to 1903; there are many references to it in horticultural literature, as in Garden 28: 72, 1885; 30: 124, 125, 1886; 31: 561, 1887; Gardener's Chronicle 58: 113, 1885; Garden and Forest 2: 184, 185, 1889. C. W. Hervey published an article describing it in New England Magazine 32: 193–198, 1905. The lilies were attacked by a disease which is described and discussed by Woods, in the 14th Bulletin of the Division of Vegetable Physiology of the United States Department of Agriculture, by A. L. Kean in Botanical Gazette 15: 8–14; and by Mr. George A. Bishop in a paper published at Hamilton in 1898. The cover-page of "Horticulture," June 16, 1917, shows a field of this "Fairy Isle Lily" at Sunny Lands.

Lilium cándidum L., TALL WHITE LILY, of southern Europe, is occasionally planted; it has flowers with a tube wider than that of the Easter Lily, and its leaves are broader.

Lilium Hènryi Baker, HENRY'S LILY, Chinese, with reddish-yellow flowers and short-stalked lanceolate leaves, was grown at Puget Sound prior to 1914, and other kinds of lilies have been grown there from time to time.

Lilium chalcedònicum L., CHALCEDONIAN LILY, of southern Europe, has few, scarlet, nodding flowers in rather long racemes. The Scarlet Turk's Cap Lily has been planted occasionally.

Lilium speciòsum Thunb., SHOWY LILY, Japanese, also occasionally planted, has several or numerous nodding white flowers blotched with red; its lower leaves are ovate, the upper lanceolate.

Phormium ténax Forst., NEW ZEALAND FLAX, of New Zealand, recorded by Lefroy as planted in Devonshire Marsh in 1875, but not flourishing, has 2-ranked, linear leaves about 4° long and 3′ wide, its red or orange flowers about ¾′ long, panicled on a scape longer than the leaves.

Hemerocallis fùlva L., DAY LILY, European, with long linear leaves, and few large clustered yellow flowers opening for a day, on scapes 1°–2° high, its roots fibrous-fleshy, its basal linear leaves ½′–¾′ wide, is occasional in gardens. H. B. Small's description, under this name, applies to some wholly different plant with broad crinkled leaves and white tubular flowers on a scape 6′–8′ high.

Ornithogalum latifòlium L., STAR-OF-BETHLEHEM, of the Levant, with long racemes of large greenish-white flowers and long narrow leaves, is grown in gardens and about houses.

Abumon africànum (L.) Britton, BLUE LILY, South African, with an umbel of blue flowers on a leafless scape, is common in cultivation, generally known as Star-of-Bethlehem. The linear leaves, shorter than the scape, appear after flowering time. [*Crinum africanum* L.; *Agapanthus umbellatus* L'Her.]

Gloriosa sìmplex L., CLIMBING LILY, African, an herbaceous climber 3° or 4° long, with alternate, broadly lanceolate, thin leaves 3′–4′ long, their tips tapering into a coiled tendril, the solitary long-peduncled flowers about 3′ wide, yellow or reddish-yellow, the perianth-segments 6, spatulate, was grown at the Agricultural Station in 1913.

Gloriosa supérba L., CLIMBING LILY, of the Old World tropics, differing from the preceding in having longer, wavy-crisped perianth-segments, is occasionally planted.

Kniphofia Uvària (L.) Hook., RED-HOT POKER, African, seen in a Hamilton garden in 1914, has narrowly linear, rough-margined leaves 2°–3° long, the dense racemes of flaming red nodding flowers on scapes as long as the leaves or longer, the perianth nearly cylindric. [*Aloe Uvaria* L.; *Tritoma Uvaria* Ker; *K. aloides* Moench.]

Gasteria decípiens Haw., TUFTED GASTERIA, grown at the Agricultural Station in 1913, native of South Africa, has fleshy, nearly triangular, thick, concave leaves 2′–3′ long, tufted on a very short stem, and a stalked raceme of curved tubular flowers about 1′ long, the perianth-tube dilated below.

Gasteria maculàta Haw., SPOTTED GASTERIA, is a similar South African species, with blotched leaves; it is recorded by Jones as grown in Bermuda. [*G. obliqua* Duval.]

Hyacinthus orientàlis L., HYACINTH, of southern Europe, is grown in gardens to some extent.

Sansevieria guineénsis (Jacq.) Willd., AFRICAN BOWSTRING HEMP, of tropical Africa, a fibre-plant with long, basal, flat mottled leaves up to 3° long, 1′–4′ wide, and dense racemes of greenish-white, fragrant, tubular flowers on scapes, the corolla 1′–1½′ long, is common in gardens and occasionally seen in waste places. [*Aletris guineensis* Jacq.]

Sansevieria zeylánica (L.) Willd., CEYLON BOWSTRING HEMP, of southern Asia, similar, but with narrower concave leaves, was grown at the Agricultural Station in 1913. [*Aletris hyacinthoides zeylanica* L.]

Chlorophytum elàtum R. Br., CHLOROPHYTUM, South African, with narrow tufted basal leaves and small whitish flowers in a narrow panicle, is grown in flower-gardens.

Urginea maritima (L.) Baker, SEA ONION, SEA SQUILL, of the Mediterranean region, with large deep bulbs up to 6′ in diameter, a slender scape 1–4° long bearing a many-flowered raceme, often 1′ long, of slender-pedicelled, purplish-white flowers, their perianth-segments ½′ long, the lanceolate leaves about 1° long and 3′ wide, is grown in flower-gardens. [*Scilla maritima* L.]

Family 3. **CONVALLARIÀCEAE** Link.

LILY-OF-THE-VALLEY FAMILY.

Scapose or leafy-stemmed herbs, with simple or branched rootstocks. Flowers solitary, racemose, panicled or umbelled, regular and perfect. Leaves broad, parallel-veined and sometimes with cross-veinlets, in *Asparagus* and its allies reduced to scales bearing filiform or flattened branchlets in their axils. Perianth inferior, 4–8-parted with separate segments, or oblong, cylindric or urn-shaped and 6-lobed or 6-toothed. Stamens 6–8, rarely 4, hypogynous or borne on the perianth; anthers introrsely, extrorsely or laterally dehiscent. Ovary 2–3-celled, superior; ovules anatropous or amphitropous; style slender or short; stigma mostly 3-lobed. Fruit a fleshy berry. Seeds few or numerous. Embryo small. Endosperm copious. About 23 genera and 215 species, widely distributed.

There are no native nor naturalized plants of this family in Bermuda.

Asparagus officinàlis L., ASPARAGUS, European, is occasionally grown as a vegetable, but scarcely as a crop, although it apparently thrives.

Asparagus plumòsus Baker, South African, an herbaceous climber with very narrow linear leaves, whitish flowers and small black berries, is cultivated on arbors and porches for decoration.

Asparagus africànus Lam., or a related species, a low climber, with linear subulate, nearly terete leaves about 5″ long and ¼″ thick, numerous in approximate verticils, was growing at the Agricultural Station in 1913, represented by a small plant neither flowering nor fruiting, the identification, therefore, not certain.

Lefroy records the successful cultivation in 1875 of a plant called *Asparagus natalènsis*, but this name does not appear to have been published, botanically; it may apply to the following species.

Asparagus Sprèngeri Regel, of Natal, seen at Montrose in 1914, is a low climber, with linear, flat, acute, whorled and scattered leaves 8–14 lines long, about 1″ wide, the small, odorous white flowers short racemose, the red globose berries about ¼′ in diameter.

Aspidistra lùrida Ker, ASPIDISTRA, Chinese, grown in flower gardens, has numerous, basal, tufted, rather rigid, oblong-lanceolate, acute, shining leaves 1°–2° long, narrowed into channeled petioles; the purplish flowers are on very short scapes among the petioles, the perianth with 8 parts, stamens 8, the stigma peltate.

Convallaria majàlis L., LILY-OF-THE VALLEY, European and North American, rarely planted, and reported as not succeeding well in Bermuda, has long rootstocks, 2 or 3 basal, oblong or elliptic, petioled leaves 1° long or less, and a 1-sided raceme of white fragrant campanulate, nodding flowers, the ovoid fruit long.

Family 4. **SMILÀCEAE** Vent.

SMILAX FAMILY.

Mostly vines with woody or herbaceous, often prickly stems. Leaves alternate, netted-veined, several-nerved, petioled. Petiole sheathing, bearing a pair of slender tendril-like appendages, persistent, the blade falling away. Flowers small, mostly green, dioecious, in axillary umbels, perianth-segments 6. Stamens mostly 6, distinct; filaments ligulate; anthers basifixed, 2-celled, introrse. Ovary 3-celled, the cavities opposite the inner perianth-segments; ovules 1 or 2 in each cavity, orthotropous; style very short or none; stigmas 1–3. Fruit a globose berry containing 1–6 brownish seeds. Endosperm horny, copious; embryo small, oblong, remote from the hilum. Genera 3, species about 200, in warm and temperate regions.

1. **SMÌLAX** L.

Rootstocks usually large and tuberous, stems usually twining, and climbing by means of the coiling appendages of the petiole. Lower leaves reduced to scales. Flowers regular. Perianth-segments distinct, deciduous. Pedicels borne on a globose or conic receptacle, inserted in small pits, generally among minute bractlets. Filaments inserted on the bases of the perianth-segments. Staminate flowers, without an ovary. Pistillate flowers usually smaller than the staminate, usually with 1–6 abortive stamens. Berry black, red or purple (rarely white), with strengthening bands of tissue running through the outer part of the pulp, connected at the base and apex. [Ancient Greek name, perhaps not originally applied to these plants.] About 225 species of wide distribution, most abundant in tropical America and Asia. Type species: *Smilax aspera* L.

Smilax Bóna-nòx L., North American, was seen in 1912 in thickets and planted borders at Mt. Langdon. It is a branched vine, somewhat prickly, with halberd-shaped pointed leaves. Lefroy records the naturalization of a species of this genus at Camden, under the name *Smilax sagittaefolia*, called Sarsaparilla. Reade notes the plant grown, used and sold as Sarsaparilla is the Virginia Creeper, *Parthenocissus quinquefolia*, and this remark is yet true. Verill states that *Smilax sagittaefolia* Lodd. is the same as *S. aspera* L.

Smilax officinàlis Kunth, South American, with ovate-oblong, cordate, acute, glabrous and shining leaves about 6′ long, was represented in the collection at the Agricultural Station in 1913.

Family 5. **DRACAENÀCEAE** Link.

DRACAENA FAMILY.

Shrubby plants or trees, with woody caudices which are generally copiously leafy. Leaves alternate: blades narrow, firm or rigid, sometimes with marginal filaments, often finely toothed. Flowers in racemes or panicles. Sepals and petals 3 each, but little dissimilar. Stamens 6. Filaments distinct, sometimes partially adnate to the perianth. Anthers 2-celled. Carpels 3, united. Ovary superior, 1–3 celled. Styles united, sometimes very short or obsolete during anthesis, but manifest in fruit. Ovules 2–several, or many in each cavity. Fruit a primarily loculicidal capsule, or berry-like and indehiscent. About 8 genera and upward of 100 species, mostly of tropical distribution.

1. YÚCCA L.

Large scapose or caulescent plants, with short or elongated, sometimes horizontal rootstocks. Leaves firm or rarely thinnish, narrow, rigidly pointed, commonly furnished with thread-like fibers along the edges, serrulate or entire. Flowers in terminal racemes or panicles. Perianth usually white, drooping, subglobose to campanulate; sepals and petals distinct or slightly united at the base. Stamens 6, hypogynous; filaments enlarged above, shorter than the perianth. Ovules numerous in each cavity. Capsule dehiscent, or berry-like and indehiscent. Seeds flattened or turgid. [Aboriginal name.] About 30 species, native of North and Central America and the West Indies, the following typical.

1. Yucca aloifòlia L. SPANISH BAYONET. (Fig. 99.) Caudex stout, up to 10° high, often branched; plant usually growing in colonies forming large masses. Leaves 3° long or less, stiff, sharp-pointed, the upper spreading, the older lower ones deflexed, the base expanded; panicle ample, often 2° long, showy; perianth white, or purplish-tinged, about 2′ long, its segments oblong; capsule pulpy, indehiscent, oblong, 2½′–3½′ long. Seeds thin. [*Yucca serrulata* of Lefroy, Jones and H. B. Small.]



Common on sand dunes and on hillsides. Very abundant and luxuriant on south coast, Somerset Island. Native. Southeastern United States and West Indies. Flowers from spring to autumn. Probably transported to Bermuda by floating. Locally used for hedges.

Yucca gloriòsa L., ELEGANT SPANISH BAYONET, of the southeastern United States, recorded by Jones, is similar with somewhat larger flowers and smaller capsules, the seeds thick.

Cordyline terminàlis (L.) Kunth, PURPLE CORDYLINE, PURPLE DRACAENA, of tropical Asia, commonly grown for ornament, has an erect trunk up to 12° high, bearing at the top a tuft of petioled, oblong purple, mottled or green leaves 1°–2° long, 4′–8′ wide with a strong midvein and many nearly parallel nerves, surmounted by a large panicle of spicate white flowers, the 6-parted perianth about ½′ long. [*Dracaena terminalis* L.]

Cordyline austràlis (Forst.) Hook., NEW ZEALAND CORDYLINE or DRACAENA, becomes taller than the preceding species and has a terminal tuft of broad linear, sessile, green, purple or variegated leaves up to 4° long, 1′–1½′ wide; its white, panicled flowers are 3″–4″ long. It is recorded by Lefroy as having been grown in Bermuda and is also mentioned by Jones. [*Charlwoodia australis* G. Don.]

Several other kinds of *Dracaenas* have been introduced at [illegible] have either not succeeded very well, or failed altogether. *D. [illegible]*

cultural race of *Pleomele fragrans* (L.) N. E. Brown, with recurved, whitish-banded leaves, is one of the most ornamental.

Family 6. **AMARYLLIDÀCEAE** Lindl.

AMARYLLIS FAMILY.

Perennial herbs (some tropical species woody or even arboreous), with bulbs or rootstocks, scapose or sometimes leafy stems and usually narrow and entire leaves. Flowers perfect, regular or nearly so. Perianth 6-parted or 6-lobed, the segments or lobes distinct, or united below into a tube which is adnate to the surface of the ovary. Stamens usually 6, inserted on the bases of the perianth-segments or in the throat of the perianth opposite the lobes. Anthers versatile or basifixed, 2-celled, the sacs usually longitudinally dehiscent. Ovary wholly or partly inferior, usually 3-celled. Style filiform, entire, lobed, or cleft into 3 stigmas at the summit. Ovules usually numerous, rarely only 1 or 2 in each cavity of the ovary, anatropous. Fruit capsular, rarely fleshy. Seeds mostly black, the embryo small, enclosed in fleshy endosperm. About 70 genera and 800 species, principally natives of tropical and warm regions, some in the temperate zones.

Perianth-tube with a crown.	1. *Narcissus.*
Perianth without a crown.	
Filaments united below by a thin membrane.	
Ovules many; capsule 3-valved.	2. *Pancratium.*
Ovules only 2 in each cavity.	3. *Hymenocallis.*
Filaments not united by a membrane.	
Low bulbous plants with grasslike leaves.	4. *Atamosco.*
Large plants with great tufts of fleshy leaves.	5. *Furcraea.*



1. **NARCÍSSUS** L.

Bulbous plants with narrow entire leaves and umbelled or solitary yellow or white large flowers. Perianth-tube cylindric, its lobes spreading or reflexed, its crown tubular to cup-shaped; stamens 6; anthers linear to oblong. Ovary 3-celled; style slender or filiform; stigma 3-lobed. Capsule loculicidally 3-valved. Seeds black, numerous. [Greek, referring to narcotic properties.] About 20 species, mostly of the Mediterranean region. Type species: *Narcissus poeticus* L.

1. Narcissus Tazétta L. NARCISSUS. (Fig. 100.) Bulbs 1′–2′ in diameter; leaves linear, nearly or quite as long as the scape, pale, glaucescent, 5″–8″ wide. Scape flattened; umbel several-flowered, the slender pedicels unequal; bract membranous; perianth-tube about 9″ long, the limb white or yellow, about 1½′ broad, the crown saucer-shaped, yellow.

Hillsides and fields. Escaped from cultivation and naturalized. Native of southern Europe and central Asia. Flowers in spring. Consists of many races.

Narcissus Jonquilla L., JONQUIL. European, common in gardens, has yellow flowers with a cup-shaped crown and is recorded by Lefroy as escaped from cultivation.

2. PANCRÀTIUM L.

Bulbous herbs with fleshy, linear basal leaves, and large white flowers, umbellate or solitary on leafless scapes. Bulbs coated. Bracts 2, membranous. Perianth funnelform, its 6 narrow lobes erect-spreading, its tube short or elongated. Stamens inserted at the perianth-throat, not exserted, united below by a thin membrane; anthers versatile. Ovary 3-celled, with many ovules in 2 rows in each cavity; style long, filiform; stigma small and capitate. Capsule 3-angled, 3-valved. Seeds numerous, flattened, angled, black. [Greek, all-powerful.] About 15 species, natives of warmer parts of the Old World, the following typical.

1. Pancratium maritimum L. SEA DAFFODIL. (Fig. 101.) Bulb short-necked, about 3′ thick, brown-coated. Scape rather stout, flattened, about 1° high, bearing an umbel of 5–10 flowers on very short pedicels; leaves several, 2° long or less, glaucous-green, 5″–10″ wide; bracts ovate, acuminate, 2′ long or less; flowers 3′–4′ long, the narrow tube gradually expanded above, somewhat longer than the linear segments; staminal membranous cup about 1′ long, toothed between the filaments. Capsule short-oblong, 1′ long, ¾′ thick, bluntly 3-lobed; seeds about 7″ long.



On grassy banks and in yards, Boaz Island near Watford Bridge. Naturalized. Native of southern Europe. Recorded by Reade from the same place in 1883, and still abundant there in 1912, flowering freely in autumn and late summer.

3. HYMENOCÁLLIS Salisb.

Fleshy herbs, with coated bulbs and large white flowers. Leaves basal, linear or nearly so, often strap-like. Scape terminated by an umbel, with membranous bracts. Perianth showy, its tube elongated, slender, its lobes narrow, nearly equal, spreading. Stamens 6; filaments adnate to the perianth tube, above which they are connected by a thin cup-like or saucer-shaped membrane; anthers narrow, versatile. Ovary 3-celled; style filiform, exserted; stigma nearly entire. Ovules 1 or 2 in each cavity. Capsule thick, rather fleshy. Seeds green and fleshy, 1 or 2 in each cavity. [Greek, beautiful membrane.] About 30 species, natives of tropical America. Type species: *Hymenocallis littoralis* (Jacq.) Salisb.



1. Hymenocallis declinàta (Jacq.) Roemer. SPIDER-LILY. (Fig. 102.) Bulbs subglobose, short-necked, 2′ in diameter or more. Scape stout, compressed, 2-edged, 2°–3° high, bearing an umbel of 8–15 sessile flowers; leaves broadly linear, acutish, 2′–3′ wide at the middle, narrowed to about 1′ wide at the base; flowers 6′–8′ long, the narrow tube about as long as the linear segments; bracts lanceolate, acute; staminal membranous cup about one third as long as the free portion of the filaments; fruit about 1½′ long. [*Pancratium ovatum* of Reade, Jones and H. B. Small; *P. declinatum* Jacq.; *Hymenocallis caribaea* of Moore; *Pancratium expansum* Sims.]

Frequent on coastal banks and common in gardens. Naturalized. Native of the West Indies. Flowers in summer and autumn.

Hymenocallis littoràlis (Jacq.) Salisb., LONG SPIDER LILY, with tube of the corolla 6′–7′ long and much longer than the limb, is common in gardens, flowering freely in late summer. It is probably native of the West Indies. [*Pancratium littorale* Jacq.; *H. pedalis* Herb.]

4. ATAMÓSCO Adans.

Acaulescent herbs, with coated bulbs and glabrous foliage. Leaves basal, narrowly linear, flat or channeled. Scape 1-flowered. Perianth white, pink, purple or yellow, its tube funnelform, its lobes 6, equal. Stamens 6, equal or nearly so; filaments adnate to the throat of the perianth-tube; anthers versatile. Ovary 3-celled; style filiform, 3-lobed at top, or stigma nearly capitate. Ovules numerous, in two rows in each cavity. Capsule 3-celled, subglobose or depressed, more or less 3-lobed, loculicidally 3-valved. Seeds black or nearly so, usually flattened. [Greek, wind-flower.] About 35 species, natives of America. Type species: *Amaryllis atamasco* L. [*Zephyranthes* Herb.]



Flower white.	1. *A. tubispatha.*
Flower rose-pink.	
Flower 1′–1½′ high.	2. *A. rosea.*
Flower 2′–3½′ high.	3. *A. Atamasco.*

1. Atamosco tubispàtha (L'Her.) Maza. WHITE ATAMASCO LILY. (Fig. 103.) Bulb ovoid or subglobose, about 1′ in diameter, short-necked. Scape slender, 6′–12′ high, shorter than or about equalling the leaves, which are 2″–3″ wide; spathe membranous, about 1′ long, 2-cleft at the top, usually shorter than the slender peduncle; flower 1½′–2′ long, white, or a little greenish, the tube cleft; capsule about 6″ thick. [*Amaryllis tubispatha* L'Her.]

Commonly cultivated and occasionally escaped into waste grounds. Native of tropical America. Flowers in spring and summer.

2. Atamosco ròsea (Spreng.) Greene. SMALL PINK ATAMASCO LILY. (Fig. 104.) Bulb ovoid or subglobose, usually less than 1′ in diameter, short-necked. Scape rather slender, 8′ high or less, as long as the leaves or longer; spathe about half as long as the peduncle, 2-cleft at the top; flower 1′–1¼′ long, rose-pink, with a short tube and obovate bluntish segments; style 3-cleft; capsule about 4″ thick. [*Amaryllis rosea* Spreng.; *Zephyranthes rosea* Lindl.]

Commonly cultivated, and occasionally escaped. Native of the West Indies. Flowers in spring and summer.

Atamosco bifòlia (Lam.) Britton [*Zephyranthes bifolia* M. J. Roemer] Santo Domingan, with a much larger rose purple flower, longer and broader leaves, is planted in gardens.

Atamosco Eggersiàna (Urban) Britton, YELLOW ATAMASCO LILY, Cuban, grown in gardens, has a bright yellow flower about 1½′ long on a scape about 1° long. [*Zephyranthes Eggersiana* Urban.]





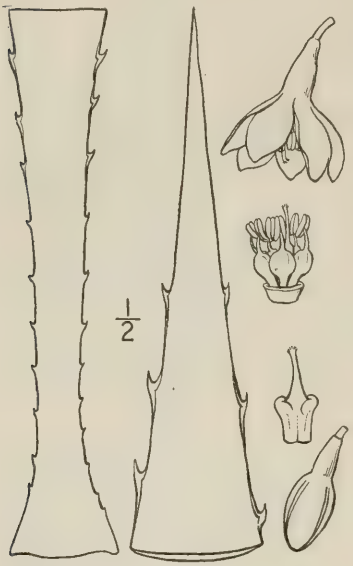
3. Atamosco Atamásco (L.) Greene. ATAMASCO LILY. (Fig. 105.) Bulb ovoid, about 1′ long. Leaves fleshy, shining, 12′ long or less, 1½″–3″ wide, blunt, usually shorter than the scape; scape terete, erect; bract 2-cleft into acuminate lobes, longer than the ovary; flowers 2½′–3½′ high, white with a purplish tinge or sometimes light purple; perianth-segments oblong-lanceolate, acute, shorter than the tube; stamens shorter than the tube; style longer than the stamens; capsule depressed, about 6″ high. [*Amaryllis Atamasco* L.]

Occasional in fields, escaped from cultivation. Native of the southeastern United States. Flowers in spring, occasionally also in autumn.

5. FURCRAÈA Vent.

Large succulent plants with tufted basal leaves and tall scapes, the [illegible] florescence terminal, paniculate. Perianth of 6 spreading segments, slightly united at the base. Stamens borne on the base of the segments, [illegible] thickened below the middle; anthers [illegible]. Ovary [illegible]

ovules in 2 rows in each cavity; style rather stout, 3-angled and thickened below, tipped by small stigma. Capsule oblong, 3-sided, 3-valved. Seeds numerous, flat. [Dedicated to Antoine Francois de Fourcroy.] About 20 species, of tropical America. Type species: *Furcraea cubensis* (Jacq.) Vent.



1. Furcraea macrophỳlla Baker. WILD SISAL. (Fig. 106.) Leaves many, the larger about 7° long by 7′ wide, nearly equally bright green on both sides, shallowly channeled above, rather firm, gradually narrowed to 2′ or 3′ wide above the expanded base, the lower prickles 1″–1½″ long, the upper strongly hooked forward, ¾′–3′ apart, borne on triangular distant teeth 2″–3″ high; scape up to 30° tall, about 6′ thick toward the base, its lanceolate bracts broad-based, the lower 1°–2° long, ascending, the upper shorter, widely spreading panicle branches curved and tortuous when young; flowers white, fading yellowish-green, with the odor of wintergreen, at night. [*F. gigantea* of Jones and Verrill.]

Abundant in thickets, woodlands and along walls, and a menace to other vegetation. Naturalized. Native of the Bahamas. Flowers in autumn, the blossoms persistent and withering in protected plants up to the middle of December, the inflorescence also bearing hundreds of ovate bulbils, by which the plant is freely propagated. Larger, flattened bulbils are sometimes produced in the leaf-axils; these grow into slender shoots 4° or 5° long, which bear flowers the following year.

Furcraea cubènsis (Jacq.) Vent., Cuban, was sent as young plants from the New York Botanical Garden to the Agricultural Station in Paget in 1913, and from the same source to Paget Rectory in 1914. [*Agave cubensis* Jacq.]

Agave americàna L., CENTURY PLANT, with bluish green, usually variegated spiny leaves, and yellow tubular flowers, presumably native of Mexico, but not known in the wild state, is freely planted for ornament. [*A. picta* Salm-Dyck.]

Agave barbadènsis Trel., BARBADOES CENTURY PLANT, has rather dull green leaves, the largest about 5° long by 6′ wide, their dark brown teeth about 1″ long, the poles up to 15° high and 5′ in diameter, were observed growing on cliffs, north shore, east of Bayley's Bay in September, 1912, the colony consisting of one dead poled plant, one large plant and many small plants from bulbils of the dead poled one, grown presumably from cultivated specimens thrown out several years before. The plant is commonly grown for ornament and produces bulbils very freely.

Agave furcròydes Lemaire, HENNEQUIN, Mexican, with narrow spiny-toothed blue-green leaves up to 5° long and 3′ or 4′ wide, the tall inflorescence mostly modified into bulbils, is commonly planted for ornament and interest.

Agave sisalàna Perrine, SISAL, Mexican, with narrow green leaves mostly unarmed except for the terminal spine, its inflorescence largely modified to bulbils, widely grown in the Bahama Islands, Cuba and Yucatan as an important fibre plant has been planted in the Public Gardens, and at Paynter's Vale.

A number of other *Agaves* have been grown from time to time. Jones and Verrill mention the Mexican species *A. mexicana* Lam., *A. striata* Zucc. and *A. xylonacantha* Salm-Dyck. In 1913, *A. Lecheguilla* Torrey, Mexican, and *A. Wightiana*, were seen at the Agricultural Station, among other unnamed species.

Later, in the same year, the following were sent to the Agricultural Station from the New York Botanical Garden, and were living in 1914:

Agave Underwoodii Trelease, Cuban.
Agave cienfuegosana Trelease, Cuban.
Agave decipiens Baker, Floridian.
Agave longipes Trelease, Jamaican.
Agave missionum Trelease, Virgin Islands [sent also to Paget Rectory in 1914].
Agave obducta Trelease, Antiguan.
Agave victoria-reginae Moore, Mexican.
Agave atrovirens Karw., Mexican.
Agave Scolymus Karw., Mexican [sent also to Paget Rectory in 1914].
Agave Vera-cruz Mill., Mexican.
Agave chloracantha Salm-Dyck, Mexican.
Agave ferox Koch, Mexican.
Agave lophantha Scheele, Mexican.
Agave Franzosinii, of hybrid origin.
Agave Wercklei Trelease, Central American.

In 1914, the following were sent to Paget Rectory from the New York Botanical Garden:

Agave Legrelliana Jacobi, Cuban.
Agave Morrisii Baker, Jamaican.
Agave longipes Trelease, Jamaican.
Agave sobolifera Salm-Dyck, Jamaican.
Agave tubulata Trelease, Cuban.
Agave Karatto Mill., Leeward Islands.

A plant of *Agave neglecta* J. K. Small, Floridian, was seen at Wood Haven in 1914.

Hippeastrum puniceum (Lam.) Urban, Barbadoes Lily, West Indian, with few, large, red or vermillion, nodding flowers at the end of a leafless scape, longer than the linear-oblong leaves, from a globose bulb about 2′ thick, blooms in spring, and is frequent in gardens. [*Amaryllis equestris* Ait.]

Crinum zeylànicum L., Ceylon Lily, of tropical Asia, occasional in gardens, has large globose bulbs, thin leaves 2°–3° long, 2′–4′ wide, and several umbelled flowers with a curved tube 4′–5′ long, the segments lanceolate.

Crinum amàbile Donn, Giant Lily, of the Seychelles, with leaves up to 5° long and 5′–6′ wide, and an umbel of purplish-white flowers 6′–7′ long, with a straight tube, blooms at intervals throughout the year. Its bulb has a long neck.

Crinum cruèntum Ker, Mexican, is similar, with a stoloniferous short-necked bulb.

Crinum asiàticum L., St. John's Lily, of tropical Asia, occasionally planted, has globose bulbs about 5′ in diameter with necks 6–9′ long, leaves 3°–4° long, 5′ wide or less, many white pedicelled flowers with slender tubes 3′–4′ long and linear segments 2′–3′ long.

Crinum gigantèum And., South African, recorded in "Florist's Exchange" of Jan. 17, 1914, as grown in Bermuda, has bulbs 4′–5′ in diameter, leaves about 3° long and 4′ wide, few white, sessile flowers with tubes up to 5′ long and imbricated, oblong, acute segments 3′–4′ long.

Nerine sarniènsis (L.) Herb., Guernsey Lily, of South Africa, flowers before its long narrow leaves appear, with an umbel of erect, red to crimson

flowers on a scape about a foot high, from ovoid bulbs about 2′ thick; its 6 stamens are exserted beyond the 6 linear-oblong recurving perianth-segments. It is frequent in gardens. [*Amaryllis sarniensis* L.]

Nerine flexuòsa (Jacq.) Herb., PINK NERINE, also South African, recorded by Jones, has declined pink flowers from similar, somewhat smaller bulbs. [*Amaryllis flexuosa* Jacq.; *Nerine pulchella* Herb.]

Eucharis grandiflòra Planch., AMAZON LILY, Colombian, occasional in gardens, has globose bulbs about 2′ thick, oblong leaves about 1° long and 5′ wide on petioles 1° long, umbelled white flowers, with a nearly cylindric tube, an expanded throat and 6 spreading oblong, blunt segments about 2′ long, the staminal cup of six connate segments ½′ long. [*E. amazonica* Linden.]

Cyrtanthus Màckenii Hook., f., IFAFA LILY, South African, grown at Water View in 1915, has ovoid bulbs about 1½′ in diameter, linear leaves 6′–12′ long and about ⅓′ wide, the several, umbellate, pure white, very fragrant flowers borne on a scape about as long as the leaves, the perianth with a narrow, gradually dilated tube about 2′ long, its spreading segments ⅓′ long, the slender, exserted style tipped by a slightly 3-lobed stigma.

Amaryllis Belladònna L., BELLADONNA LILY, South African, with large bulbs, the scape about 2½° high bearing an umbel of short-pedicelled, rose-colored, fragrant flowers about 3′ long, the corolla-lobes somewhat spreading, is planted in flower-gardens, blooming before the long narrow strap-shaped leaves appear. In Amaryllis the stamens are separate, not connected by a membrane, and not exserted beyond the corolla.

Curculigo recurvàta Dryand., CURCULIGO, East Indian, is a stemless herbaceous plant, with dark green, narrowly oblong, acute, strongly parallel-veined, arching leaves 2°–3° long, the petioles short, stout and channeled; the rather small yellow flowers are in short, dense spikes borne on hairy, curved peduncles about as long as the petioles; the corolla is about ½′ broad, the ovary beaked. It is frequently grown for ornament.

Sternbergia lûtea (L.) Ker., STERNBERGIA, of the Mediterranean region, reported as grown in flower-gardens, has a deep bulb 1′–2′ thick, slender scapes, 1–4 from each bulb, mostly somewhat shorter than the narrowly linear leaves, the bright yellow flower about 2′ high, the 6-lobed corolla funnelform. [*Amaryllis lutea* L.]

Polianthes tuberòsa L., TUBEROSE, Mexican, frequent in flower gardens, has a tuberous rootstock, erect stems 1½°–3° high bearing several narrowly linear leaves, the lower ones 1°–1½° long, and a terminal spike of white, fragrant flowers, the perianth-segments about 8″ long, the stamens borne at about the middle of the perianth-tube.

Leucojum aestìvum L., SUMMER SNOWFLAKE, European, occasionally grown in gardens, has bulbs about 1′ thick, linear leaves about 1° long, and a scape bearing several white nodding flowers, the corolla-segments with greenish tips.

Doryanthes Pâlmeri W. Hill, PALMER'S DORYANTHES, Australian, seen at the Agricultural Station in 1913, resembles an *Agave*, having a basal tuft of narrow leaves up to 6° long, the outer ones recurved, the inner nearly erect, all with brown, tubular tips, entire-margined. The flowering stem arises to a height of about 25°, surmounted by a panicle, about 3° long, of scarlet flowers.

Alstroemeria inodòra Herb., ALSTROEMERIA, Brazilian, grown at Mount Hope in 1914, has tuberous rootstocks, erect leafy stems about 2° high, the leaves of sterile stems narrowly oblong, petioled, 3′–4′ long, those of flowering stems linear-lanceolate and smaller, the umbelled, terminal flowers with 6 spatulate segments about 2′ long, rose-colored and cinnamon-brown mottled. [*A. nemorosa* Graham.]

Family 7. **DIOSCOREÀCEAE** Lindl.

YAM FAMILY.

Herbaceous or slightly woody twining vines with fleshy or woody rootstocks, slender stems, petioled, mostly cordate, several-nerved and reticulate-veined leaves, and small inconspicuous dioecious or monoecious regular flowers in spikes, racemes or panicles. Perianth 6-parted, that of the pistillate flowers persistent. Staminate flowers with 6 or 3 stamens, sometimes with a rudimentary ovary. Pistillate flowers with an interior 3-celled ovary, 3 styles and 3 terminal stigmas, sometimes also with 3 or 6 staminodia; ovules 2 (rarely 1) in each cavity of the ovary, pendulous, anatropous or amphitropous. Fruit a 3-valved, 3-angled capsule in the following genus. Endosperm of the seed fleshy or cartilaginous, enclosing the small embryo. About 9 genera and 175 species, mostly natives of America, a few in the Old World.

1. **DIOSCOREÀ** L.

Characters of the family as defined above. [Name in honor of the Greek naturalist Dioscorides.] About 160 species, most numerous in tropical regions, a few in the temperate zones. Type species: *Dioscorea sativa* L. There are no native nor naturalized species of the Yam Family in Bermuda.

Dioscorea sativa L., one of the yams widely cultivated in tropical America, has been grown locally, at times, but has not obtained any economic importance, and it is not known to exist in Bermuda at present. It is a high-climbing glabrous vine, with thin, slender-petioled, broadly ovate, deeply cordate acuminate, palmately-veined leaves, minute, green flowers in long, clustered spikes, and large underground edible tubers. [*D. lutea* of Jones.]

Dioscorea bulbífera L., AIR POTATO, of tropical Asia, sometimes planted for interest, has similar leaves and flowers, but has the peculiarity of producing tubers in the leaf-axils.

Family. 8. **IRIDÀCEAE** Lindl.

IRIS FAMILY.

Perennial herbs with narrow equitant 2-ranked leaves and perfect, mostly clustered flowers subtended by bracts. Perianth of 6 segments or 6-lobed, its tube adnate to the ovary, the segments or lobes in two series, convolute in the bud, withering-persistent. Stamens 3, inserted on the perianth opposite its outer series of segments or lobes; filaments filiform, distinct or united; anthers 2-celled, extrorse. Ovary inferior, mostly 3-celled; ovules mostly numerous in each cell, anatropous; style 3-cleft, its branches sometimes divided. Capsule 3-celled, loculicidally dehiscent, 3-angled or 3-lobed (sometimes 6-lobed), many-seeded. Endosperm fleshy or horny; embryo straight, small. About 57 genera and 1000 species, of wide distribution.

Perianth segments separate, spreading
Perianth funnelform, 6-lobed

1. SISYRÍNCHIUM L.

Perennial mostly tufted slender herbs with fibrous roots from contracted rootstocks, simple or branched 2-winged or 2-edged stems, and linear leaves. Flowers from terminal spathes consisting of mostly one pair of opposite conduplicate herbaceous bracts enclosing membranous scales; perianth blue, violet, or white with a yellow eye, rarely all yellow, the 6 oblong or obovate segments spreading and aristulate; filaments monadelphous; anthers linear or oblong, the sacs distinct at base; style threadform, the branches filiform or obsolete; ovary 3-celled; capsule globose, oval or obovoid, usually trigonous, loculicidally 3-valved; seeds globose to obovoid, often angled, pitted or smooth. Flowers fugacious, opening successively in sunlight, each usually lasting but a day. [Probably not less than 150 species, nearly all American, the following typical.]



1. Sisyrinchium Bermudiàna L. BERMUDIANA. BERMUDA IRIS. BERMUDA BLUE-EYED GRASS. (Fig. 107.) Glabrous; stem rather slender, 10′–20′ high, flattened and winged, usually branched. Leaves linear, smooth, 2″–5″ wide, acuminate, the basal ones 4′–12′ long, those of the stem shorter; peduncles several, flattened and winged like the stem, but more slender; spathes about 1′ long, acute, narrowly scarious-margined, several-flowered; pedicels filiform, longer than the spathe; perianth-segments obovate, emarginate, long-aristulate, bright violet-blue with yellow bases, 6″–8″ long; filament-column about one third as long as the perianth-segments, the anthers yellow; capsule globose-oblong, blunt, 3″–4″ long, splitting into 3 valves and long-persistent. [*S. iridoides* Curtis, Bot. Mag. 3: *pl. 94.*]

In all dry sunny places, very abundant, and the most characteristic herbaceous plant of Bermuda. Endemic. Flowers in spring.

For many years, and until the many continental species of *Sisyrinchium* were known to botanists, the Bermuda plant was regarded as the same as North American kinds, a view which has been proven quite erroneous, and the Bermuda species does not grow wild elsewhere, as pointed out by Hemsley in 1884 (Journ. Bot. 22: 108–110) but the early botanists considered it distinct; it, doubtless, originated however from seed of one of the continental species brought to Bermuda by a bird or on the wind, the plant becoming differentiated through isolation from its parent-stock. Among living species it resembles more *Sisyrinchium alatum* Hooker, of Mexico than any of the species of the eastern United States or the West Indies, but it would not be safe to conclude that *S. alatum* was its ancestor.

The oldest known specimen of this beautiful and interesting plant is one collected by J. Dickenson about 1699, preserved in the Sloane herbarium at the British Museum of Natural History. Early illustrations of it are given by Plukenet (Phytographia *pl. 61, f. 2*) and by Dillenius (Hortus Elthamensis *pl. 41, f. 48*) and a fine colored picture by Redouté (Liliacées *pl. 149*).

The Iris-like, equitant leaves begin to appear in September. The plant is not hardy in England nor in the northeastern United States, but it would

probably grow well in southern Florida. Plants taken to the New York Botanical Garden flowered freely under glass, and from one of these was made Miss Eaton's painting, reproduced as a frontispiece for this book.

2. **FREÈSEA** Eckl.

Herbs with fibrous-coated corms, narrow leaves and showy yellow or white flowers in unilateral spikes, each flower subtended by 2 spathe-like bracts. Perianth with a curved funnelform tube and an expanded slightly 2-lobed limb, its somewhat unequal segments oblong; stamens borne on the perianth-throat; filaments filiform; anthers linear, sagittate. Ovary 3-celled, many-ovuled; style filiform, its short branches 2-cleft. Capsule oblong, loculicidally 3-valved. Seeds turgid. [Name not explained.] A monotypic South African genus.



1. Freesea refràcta (Jacq.) Klatt. FREESEA. (Fig. 108.) Corm ovoid to subglobose, 1′ long or more. Leaves 4′–10′ long, mostly basal, about 3″ wide, acute; stem 1°–1½° high, flexuous, simple or few-branched; spike spreading nearly at right angles, 2′–4′ long, several-flowered, bracts oblong-lanceolate, 8″ long or less; perianth 1′–1½′ long, the limb much shorter than the tube. [*Gladiolus refractus* Jacq.]

In fields, spontaneous or persistent after cultivation. Native of South Africa. Flowers in spring. Races differ in size and color of the flowers.

Gladiolus species, CORN-FLAG, GLADIOLIUS, grown in gardens, in several races, flower in spring and summer; the style-branches are undivided.

Iris germànica L., FLEUR DE LIS, grown in gardens, flowers in spring, and other species of *Iris* are occasionally cultivated. Jones records *I. virginica* L., North American, and *I. violacea* Sweet, of southern Europe.

Antholyza aethiòpica L., South African, with foliage similar to that of *Gladiolus*, the reddish-yellow flowers with a curved tube, is commonly grown as a garden flower.

Tigridia Pavònia (L. f.) Ker., TIGER-FLOWER, Central American, bulbous, with linear leaves often 1° long, tapering at each end, simple stems about 2° high, bearing few or solitary yellow or orange, usually mottled flowers 4′–6′ broad, the perianth-segments of two dissimilar series of 3 each, the larger ones spreading, is occasionally grown in flower-gardens. [*Ferraria Pavonia* L. f.]

Tritonia crocosmaeflòra Lemoine, MONTBRIETIA, South African, of hybrid origin, grown in gardens, is a bulbous plant 3°–4° high, with narrowly linear leaves about 1° long, and showy orange flowers, sessile in terminal panicles, its perianth-segments narrowly oblong.

A scarlet-flowered species of *Ixia*, with linear leaves about 8″ long and 1″ wide, the very slender corolla-tube 1′ long, the corolla-limb about ½′ wide, was seen growing in the lawn at Norwood in 1914. *Ixias* are natives of South Africa.

Order 10. SCITAMINÀLES.

Large monocotyledonous herbs with very irregular flowers. Ovary inferior, composed of several united carpels. Seeds with endosperm.

Pollen-bearing stamen only 1.
Ovules many in each ovary-cavity; fruit a capsule.
Anthers 1-celled. Fam. 1. CANNACEAE.
Anthers 2-celled. Fam. 2. ZINGIBERACEAE.
Ovule 1 in each ovary-cavity; fruit a utricle. Fam. 3. MARANTACEAE.
Pollen-bearing stamens 5. Fam. 4. MUSACEAE.

Family 1. CANNÀCEAE Link.

CANNA FAMILY.

Perennial herbs, with erect stems. Leaves alternate; the petioles sheathing the stem. Flowers perfect, in terminal racemes or spike-like racemes. Perianth usually showy, large. Sepals 3, imbricated, erect. Petals 3, more or less united below into a tube and adnate to the corolloid androecium. Filaments petal-like, the 3 exterior nearly equal, sterile, the 2 interior more or less united, but only one filament anther-bearing. Carpels 3; ovary 3-celled, inferior, with parietal placentae; style petal-like; stigma marginal; ovules numerous. Fruit a 3-celled loculicidally 3-valved papillose or bristly capsule. Seeds with a membranous or somewhat fleshy testa, embryo sometimes flattened; endosperm horny. Only the following genus.

1. CÁNNA L.

Characters of the family. [Latin, a cane or reed.] About 35 species, natives tropical America. Type species: *Canna indica* L.



1. Canna índica L. CANE SHOT. INDIAN SHOT. (Fig. 109.) Stems 1°–3° tall, commonly simple, slender. Leaves oblong, elliptic-oblong or elliptic-ovate, 8′–20′ long, acute or acuminate, entire, rounded at the base; petioles sheathing; spikes few-flowered; sepals oblong, acute; petals pale green or yellowish-green, lanceolate, about 1½′ long; filaments bright red; lip reddish-yellow, spotted with red, entire.

Waste grounds, escaped from cultivation.

Canna coccínea Ait., West Indian, a similar usually taller species, the lip 2-cleft, is grown for ornament.

Canna glaùca L., YELLOW CANNA, tropical American, with bright yellow flowers (probably the plant recorded by H. B. Small as *C. lutea*) and **Canna édulis** Ker., TOUS-LES-MOIS, a tall red-flowered species with tuberous edible rootstocks, are grown in gardens, the latter, occasionally, as a crop. Numerous selected Cannas are grown for ornament.

Family 2. **ZINGIBERÀCEAE** Lindl.

GINGER FAMILY.

Perennial, mostly large herbs, with sheathing leaves, and perfect irregular flowers in bracted clusters. Calyx tubular or spathe-like. Corolla of 3 petals, separate or more or less united. Stamen 1, the anther 2-celled. Staminodes commonly 2 and petaloid. Ovary mostly 3-celled, many-ovuled; style slender. About 25 genera and over 300 species, of tropical distribution.

Bermuda has no native nor naturalized species of this family.

Zingiber Zíngiber (L.) Karst. [*Z. officinale* Roscoe], GINGER, East Indian, is easily grown, succeding best when slightly shaded, but has not become of economic importance, though the rootstocks are of good quality. It has an upright, leafy stem up to 4° high, the lanceolate or oblong-lanceolate leaves 1° long or less; its rather large flowers are borne in a dense spike 2′–4′ long, on a scaly scape which arises from the rootstock, and is shorter than the leaf bearing stem; the lateral corolla-lobes are oblong, about ½′ long, and somewhat longer than the broader, 3-lobed, purple lip.

Languas speciòsa (Wendl.) J. K. Small, SHELL-FLOWER, SHELL-PLANT, grown for ornament, has leafy stems 8°–12° high, the shining oblong-lanceolate leaves 6′–15′ long, acuminate at the apex; the bracted flowers are borne in dense, terminal nodding panicles, the rachis and pedicels pubescent; the calyx is nearly 1′ long, the white corolla-lobes, tinged with magenta, are shorter than the crisped, yellow, red-brown-variegated lip. [*Alpinia nutans* Roscoe; *A. speciosa* (Wendl.) Schum.; *Renealmia occidentalis* of Jones.]

Hedychium coronàrium Koenig. WHITE HEDYCHIUM, East Indian, also grown for ornament, has leafy stems up to 8° tall, the lanceolate or oblong-lanceolate, pointed leaves 2° long or less; the large white flowers are in terminal dense bracted spikes, the slender corolla-tube about twice as long as the calyx, its lobes nearly linear, the large white lip very broad, often 2′ wide. [*H. elatum* of Jones; *H. speciosum* of H. B. Small.]

Hedychium Gardneriànum Roscoe, YELLOW HEDYCHIUM, also East Indian, occasionally planted, has similar leaves, but the flowers are yellow, and much smaller, the lip oval, about ¾′ wide.

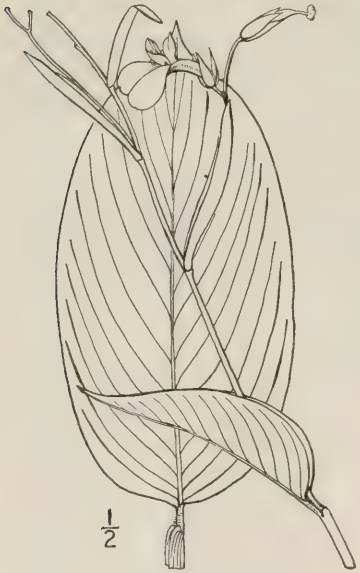
Family 3. **MARANTÀCEAE** Lindl.

ARROWROOT FAMILY.

Tall herbs, perennial by rootstocks or tubers, or sometimes annual, with scapose or leafy stems, mostly large entire long petioled sheathing leaves, often swollen at the base of the blade, the veins pinnate, parallel. Flowers perfect, or sometimes polygamous, in panicles, racemes or spikes. Calyx 3-toothed superior, its segments distinct to the summit of the ovary, or united into a tube, normally in 2 series of 3, the outer (sepals) usually different from the inner (petals). Perfect stamen 1; anthers 1–2-celled. Staminodia mostly 5, often petal-like, very irregular. Ovary 1–3-celled, inferior; ovule 1 in each cavity, anatropous; style slender, curved, terminal; stigma simple. Fruit capsular or berry-like. Seed solitary in each cavity. Embryo central, in copious endosperm. About 12 genera and 160 species, mostly tropical.

1. MARÁNTA L.

Caulescent herbs, with branching stems. Leaves alternate, ovate or lanceolate, often abruptly bent at the base, the petioles partly sheathing. Flowers solitary or few in panicles. Sepals 3, herbaceous, equal, distinct; corolla often white, the 3 petals partially united. Staminodia conspicuous, 2 of them surpassing the corolla. Anthers 1-celled. Ovary 1-celled but with 2 additional abortive cavities. Style stout, curved. Stigma oblique. Capsule utricle-like. Seed erect, solitary, [Dedicated to Barth. Maranta, a Venetian physician.] Some 15 species, natives of tropical America, the following typical.



1. Maranta arundinàcea L. ARROWROOT. (Fig. 110.) Stems 3°–5° tall, from starchy copiously scaly rootstocks, more or less branched and rather weak, sometimes reclining, zigzag, 4′–10′ long, acute, many-veined; flowers few, fugacious; sepals green, lanceolate or linear-lanceolate, 5″–6″ long; corolla white, nearly 1′ long, its lobes lanceolate; staminodia flabellate-cuneate, surpassing the corolla, erose, notched; capsules broadly oblong.

Spontaneous or persistent after cultivation. Native of tropical America. Flowers in summer and autumn, sometimes earlier. Arrowroot was formerly much more extensively grown and exported than now.

Maranta bícolor Ker., TWO-COLORED ARROW-ROOT, Brazilian, taken from the New York Botanical Garden to Paynter's Vale in 1913, and growing pretty well there in shade in 1914, is about 1° high, or less, with ovate, short-petioled acute leaves 3′–6′ long, cordate at the base, purple beneath, green above with brown-green blotches between the margins and midrib, and a central light green area extending outward along the stronger lateral veins.

Family 4. MUSÀCEAE J. St. Hilaire.

BANANA FAMILY.

Tall herbaceous plants with large, entire, finely veined leaves, and monoecious or perfect, clustered, bracted flowers. Sepals 3, distinct or united. Corolla of 3 distinct or more or less united petals. Pistil of 3 united carpels. Polliniferous stamens 5. Ovary inferior, 3-celled; style central; stigma 3–6-toothed, or 3-cleft. Fruit indehiscent or capsular and 3-valved. Four genera and 50 species or more, natives of tropical regions, none native nor naturalized in Bermuda.

Musa Cávendishii Lamb., CHINESE DWARF BANANA, Chinese, extensively and very successfully grown, is usually not over 6° or 8° high, with a stem

about 6′ thick; its spreading leaves are 2°–4° long and 1° wide or more. The monoecious flowers are in terminal, large-bracted, drooping panicles, the pistillate ones borne nearest the leaves, the staminate beyond the pistillate, therefore below them in the drooping clusters; the ovate, reddish brown bracts conceal the young flowers; the numerous yellow fruits are 4′–5′ long, the fragrant flesh delicious.

Musa sapiéntum L., Yellow Banana, East Indian, cultivated in several races, but not as extensively as the preceding, is taller, with larger and longer leaves, up to 9° long, the usually fewer, bright yellow fruits mostly larger.

Musa paradisìaca L., Plantain Banana, sometimes regarded as a race or variety of *M. sapientum*, is occasionally grown, but does not ordinarily fruit heavily in Bermuda. It is tall, with large yellow fruits up to 10′–14′ long, which are insipid when raw but excellent when cooked, and a very important food-fruit in tropical regions.

Musa rùbra Fleming, Red Banana, tall, with arching leaves and dark red fruit 6′–9′ long, is also sometimes considered to be a race or variety of *M. sapientum*, and is occasionally grown.

Ravenàla madagascarènsis J. F. Gmelin, Travelers' Tree, Madagascan, has a trunk up to 20° high, the long-petioled, banana-like leaves spreading in one plane, their thick petiole-bases densely imbricated, containing much watery sap which is drinkable; the peduncled axillary flower-clusters are 6′–10′ long, the large, bracted flowers white, the fruit capsular, 3-valved. This elegant plant, the giant of the Banana Family, is occasionally seen in gardens, but is not as luxuriant as in warmer lands.

Strelítzia regìnae Banks, Bird-of-Paradise Flower, South African, frequent in gardens, has leaves 2½°–3° long arising from rootstocks, the petioles longer than the blades; the purple and orange flowers are about 4′ long, on scapes as long as the leaves or shorter, subtended by a purplish, pointed bract; the fruit is a 3-valved capsule. The plant is also known as Crane's-bill.

Strelítzia angústa Thunb., Large Strelitzia, also South African, occasionally grown, forms a trunk up to 15° high bearing leaves 6°–9° long with petioles about twice as long as the blades, the white flowers borne on short, axillary peduncles, and subtended by a dark purple spathe.

Order 11. ORCHIDÀLES.

Monocotyledonous herbs, many tropical species epiphytes. Flowers mostly very irregular, complete and perfect, their parts in 3's or 6's. Ovary inferior, compound. Seeds very numerous and minute, without endosperm.

Family 1. ORCHIDÀCEAE Lindl.

Orchid Family.

Perennial herbs, with sheathing entire leaves, sometimes reduced to scales, the flowers perfect, irregular, bracted, solitary, spiked or racemed. Perianth superior, of 6 segments, the 3 outer (sepals) similar or nearly so, 2 of the inner ones (petals) lateral, alike; the third minor one (lip) often similar, often markedly so, usually larger, often spurred. Stamens [illegible]

ously united with the style into an unsymmetrical column; anther 1 or in *Cypripedium* 2, 2-celled; pollen in 2–8 pear-shaped, usually stalked masses (pollinia), united by elastic threads, the masses waxy or powdery, attached at the base to a viscid disk (gland). Style often terminating in a beak (rostellum) at the base of the anther or between its sacs. Stigma a viscid surface, facing the lip beneath the rostellum, or in a cavity between the anther-sacs (clinandrium). Ovary 3-angled, 1-celled; ovules numerous, anatropous, on 3 parietal placentae. Capsule 3-valved. Seeds mostly spindle shaped, the loose coat hyaline, reticulated; embryo fleshy. About 410 genera and 5000 species, of wide distribution, most abundant in the tropics, many of those of warm regions epiphytes.

1. **IBÍDIUM** Salisb.

Erect herbs, with fleshy-fibrous or tuberous roots and slender stems or scapes, leaf-bearing below or at the base. Flowers small, spurless, spiked, 1–3-rowed, the spikes more or less twisted. Sepals free, or more or less coherent, or sometimes united with petals into a galea. Lip concave, erect, embracing the column, spreading and crisped, or rarely lobed or toothed at the apex, bearing minute callosities at the base. Column arched below, obliquely attached to the top of the ovary. Anther without a lid, borne on the back of the column, erect. Stigma ovate, prolonged into an acuminate beak, at length bifid, covering the anther and stigmatic only underneath. Pollinia 2, 1 in each sac, powdery. Capsule ovoid or oblong, erect. [Greek, the anther has a fancied resemblance to the head of an Ibis.] About 55 species, widely distributed in tropical and temperate regions. Type species: *Ophrys spiralis* J. E. Smith.



1. Ibidium xyridifòlium J. K. Small. Xyris-leaved Ladies-tresses. (Fig. 111.) Roots tuberous, several; stems 8′–2° tall, simple, glabrous or nearly so below the inflorescence; leaves linear, 2′–4′ long, the largest of the lower ones barely reaching the middle of the stem; spike 1′–6′ long; bracts lanceolate to oblong-lanceolate; perianth whitish, pubescent without, 3″–4″ long, curved and slightly nodding; lateral sepals linear-lanceolate; lip about 3″ long, cordate at the base, with a rhombic-orbicular base and oblong much crisped drooping or recurved tip; callosities nipple-like, projecting backward; capsules 3″–4″ long, obovoid-clavate, curved. [*Spiranthes tortilis* of Rein, H. B. Small, Verrill, and Hemsley; *S. brevilabris* of Lefroy.]

Locally abundant in grassy places, Devonshire and Pembroke Marshes, flowering in spring. Southeastern United States, its minute light seeds probably transported to Bermuda by winds.

A number of tropical epiphytic orchids have been brought in and are to be seen in gardens fastened to or suspended from trees or grown in greenhouses but they do not succeed very well, except under glass, though they flower at intervals. Species of the large American genus *Oncidium* with yellow or orange flowers in long wands or panicles are, perhaps, the most likely to succeed. *Vanilla*, a vine of this family, climbing by aerial roots, grown in tropical regions for its pods, has been tried, but hitherto without economic success. Among the genera grown in greenhouses mention may be made of *Cattleya*, *Dendrobium*, *Miltonia*, *Vanda* and *Selenipedilum*.

Sub-class 2. **DICOTYLÉDONES.**

Embryo of the seed with two cotyledons (in a few genera one only), the first leaves of the germinating plantlet opposite. Stem exogenous, of pith, wood and bark (endogenous in structure in Nymphaeaceae), the wood in one or more layers surrounding the pith, traversed by medullary rays and covered by the bark. Leaves usually pinnately or palmately veined, the veinlets forming a network. Parts of the flower rarely in 3's or 6's.

Dicotyledonous plants are first definitely known in Cretaceous time. They constitute between two-thirds and three-fourths of the living angiospermous flora.

Series I. **Choripétalae.**

Petals separate and distict from each other, or wanting.

The series is also known as Archichlamideae, and comprises most of the families formerly grouped under Apetalae (without petals) and Polypetalae (with separate petals). Exceptions to the typical feature of separate petals are found in the Fabaceae, in which the two lower petals are more or less united; in the Fumariaceae, where the two inner petals or all four of them are sometimes coherent; in some Crassulaceae; the Polygalaceae, in which the three petals are united with each other, and with the stamens; Oxalidaceae and Ilicaceae, whose five petals are sometimes joined at the base.

‡ *Petals none* (except in family Portulacaceae and in most Caryophyllaceae, which are herbs with the leaves nearly always opposite, the seeds with endosperm, and in the pistillate flowers of the walnuts, *Juglans*).

Calyx none (except in the family Juglandaceae, trees with odd-pinnate leaves, and sometimes in Casuarinaceae).
Loosely jointed trees, the leaves reduced to verticillate scales. Order 1. Casuarinales.
Plants not loosely jointed; leaves normal.
Herbs with small perfect flowers, in spikes. Order 2. Piperales.
Trees or shrubs; staminate flowers, and sometimes also the pistillate, in aments.
Leaves simple.
Fruit many-seeded; seeds with a tuft of hairs at one end. Order 3. Salicales.
Fruit 1-seeded. Order 4. Myricales.
Leaves odd-pinnate; fruit a nut enclosed in a husk. Order 5. Juglandales.
Calyx present.
Flowers, at least the staminate ones, in aments. Order 6. Fagales.

Flowers not in aments (in ament-like spikes in *Morus*); but variously clustered, or rarely solitary.
Flowers monoecious, dioecious or polygamous, or perfect in *Proteales*; ovary superior, 1-celled.
Flowers regular. Order 8. URTICALES.
Flowers irregular. Order 9. PROTEALES.
Flowers dioecious or perfect; ovary inferior, at least in part.
Ovary 1-celled. Order 10. SANTALALES.
Ovary several-celled (usually 6-celled) flowers perfect. Order 11. ARISTOLOCHIALES.
Flowers mostly perfect; ovary superior.
Embryo straight or nearly so; fruit an achene. Order 12. POLYGONALES.
Embryo coiled, curved or annular; fruit not an achene. Order 13. CHENOPODIALES.

‡‡ *Petals present* (wanting in Ceratophyllaceae, aquatic herbs with whorled dissected leaves; in many Ranunculaceae; in Lauraceae, alternate-leaved aromatic trees and shrubs; in *Zanthoxylum*, pinnate-leaved trees of the Rutaceae; in many Euphorbiaceae; in some species of *Ludwigia* in Onagraceae; in *Proserpinaca* of the Haloragidaceae).

A. *Ovary superior, free from the calyx* (partly or wholly inferior in Hydrangeaceae, Grossulariaceae, Losasaceae and Malaceae).

Carpels solitary, or several and distinct (united in some Nymphaeaceae); stamens mostly hypogynous and more numerous than the sepals; sepals mostly distinct. Order 14. RANALES.
Carpels 2 or more, united into a compound ovary; stamens hypogynous; sepals mostly distinct.
Plants not insectivorous. Order 15. PAPAVERALES.
Insectivorous plants, secreting a viscid liquid, with basal leaves and scapose flowers. Order 16. SARRACENIALES.
Carpels solitary, or several and distinct, or sometimes united; stamens mostly perigynous or epigynous; sepals mainly united or confluent with the concave receptacle (hypanthium). Order 17. ROSALES.
Carpels united into a compound ovary; sepals mostly distinct.
Stamens few, rarely more than twice as many as the petals.
Stamens as many as the sepals or fewer and opposite them, or more numerous.
Ovules pendulous, the raphe toward the axis of the ovary. Order 18. GERANIALES.
Ovules pendulous, the raphe away from the axis of the ovary, or erect, or ascending. Order 19. SAPINDALES.
Stamens as many as the sepals and alternate with them, opposite the petals when these are present; ovules erect. Order 20. RHAMNALES.
Stamens usually very numerous (except in Violaceae and Passifloraceae); disc inconspicuous, or none.
Sepals valvate; placentae united in the axis of the capsule. Order 21. MALVALES.
Sepals or calyx-segments imbricated or convolute; placentae mainly parietal, sometimes united in the axis.
Leaves bilaterally symmetrical.
Sepals separate. Order 22. HYPERICALES.
Sepals united. Order 23. PASSIFLORALES.
Leaves oblique. Order 24. BEGONIALES.

B. *Ovary inferior, adnate to the calyx, wholly or in part* (except in Lythraceae and our Melastomaceae, where it is usually merely enclosed by it, and in Thymeleaceae and Elaeagnaceae, which are shrubs or trees with no corolla).

Fleshy spiny plants, with jointed stems, the leaves mostly very small or none; calyx-segments and petals numerous. Order 25. OPUNTIALES.
Herbs, shrubs or trees, not fleshy or spiny; calyx-segments rarely more than 5.
Ovules several or numerous in each cavity of the ovary (except in Haloragidaceae, aquatic herbs). Order 26. MYRTALES.
Ovule 1 in each cavity of the ovary. Order 27. AMMIALES.

Order 1. CASUARINÀLES.

Shrubs or trees with loosely jointed angled branches, the leaves reduced to small, appressed or recurved scales, 4 or more in a whorl at a node, sometimes united into a sheathing base. Flowers unisexual, the staminate in slender terminal spikes, subtended by imbricated bracts, often with an anterior and posterior perianth-part, 1 stamen and a large anther with sacs opening lengthwise. Pistillate flowers in dense spikes or cones; perianth wanting; ovary 1-celled; styles slightly united at the base, the 2 branches slender. Ovules 1 or 2 in a cavity, orthotropous or half-anatropous. Fruit a collection of winged achenes subtended by accrescent bractlets. Seed solitary, with a membranous testa.

Family 1. CASUARINÀCEAE Lindl.

BEEFWOOD FAMILY.

Characters of the order. Only the genus *Casuarina* with 20 species, mostly Australian.

Casuarina equisetifòlia L., HORSETAIL TREE, BEEFWOOD, SOUTH SEA IRONWOOD, a slender and graceful rapidly growing tree, with slender branches, attaining a height of 30° or more and freely branching, the sheath teeth 6–8 in each whorl, its ripe cones about ½′ thick, roughened by the projecting, pubescent bracteoles, is commonly planted for ornament and interest, in Bermuda, as in South Florida and the West Indies. It is native of Australia.

Casuarina quadrivàlvis Labill., FOREST SWAMP OAK, also Australian, seen as a young plant at the Agricultural Station in 1914, has stouter deeply grooved branchlets, the teeth about 10; its globose or ovoid cones become 1′ in diameter.

Another species of *Casuarina*, grown at Bellevue, has more slender branches and sends up suckers from its roots, its ripe cones less than ½′ in diameter, the projecting bracteoles glabrous. It appears to agree in foliage and cones with the description of *C. Cunninghamiàna* Miq.: the same species is grown at King's House Gardens on the island of Jamaica.

Order 2. PIPERÀLES.

Dicotyledonous plants, with neither petals nor sepals, the spicate flowers bracteolate.

Family 1. PIPERÀCEAE H.B.K.

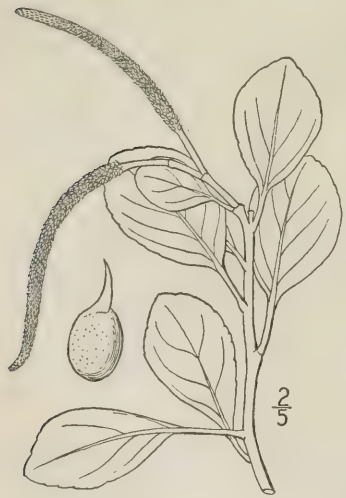
PEPPER FAMILY.

Herbs, shrubs or trees, often aromatic. Leaves leathery, or fleshy, usually entire. Flowers perfect or unisexual, in solitary or clustered spikes or rarely in racemes. Perianth none. Stamens 2–6, or rarely 8 or 10, inserted under the ovary; filaments distinct, sometimes adnate to the base of the ovary; anthers attached at the base, the 2 sacs often confluent. Gynoecium of 3 or rarely more united carpels. Ovary 1-celled, sessile or nearly so. Stigmas 3 or many. Ovule solitary, erect, orthotropous. Fruit indehiscent. Seed solitary, with a membranous or leathery testa. Endosperm

mealy, with the minute embryo at the top. Ten genera and over 1000 species, widely distributed in tropical regions.

1. PEPERÒMIA R. & P.

Annual or perennial herbs. Leaves alternate, opposite or whorled, fleshy. Flowers perfect, minute, in dense or open slender spikes furnished with peltate bractlets. Stamens 2; filaments usually short; anthers transversely broadened, 2-valved, extrorse, the cavities confluent. Pistil solitary; stigmas forming a brush-like tuft. Nutlets small, often minute, with a thin pericarp. [Greek, like pepper.] Over 400 species, most abundant in tropical America. Type species: *Peperomia secunda* R. & P.



1. Peperomia septentrionàlis S. Brown. WILD PEPPER. (Fig. 112.) Perennial, fleshy, glabrous; stem branched, the branches spreading or ascending, stout, 2″–3″ thick, 6′–18′ long, the plants often growing in large clusters. Leaves alternate, deep green and somewhat shining above, paler green, black-dotted and dull beneath, petioled, ovate, oval, or obovate, obtuse or emarginate at the apex, narrowed or obtuse at the base, the blades 1½′–2½′ long, the stout petioles 1½′ long or less, the midvein prominent beneath, the 9–11 lateral veins obscure; spikes terminal, or borne in the upper axils, solitary or several, 2′–6′ long, densely flowered; nutlets minute, about ½″ long, oblong, slightly papillose, with a subulate, straight or slightly curved back.

Abundant on shaded rocks, Tucker's Town to the Causeway and about the northern part of Harrington Sound. Also in the cave near Smith's Parish Church and in Paget Marsh. Flowers from autumn to spring. Endemic.

The plant probably has its closest relative in *Peperomia obtusifolia* (L.) A. Dietr., of the West Indies, but differs in shorter and broader leaves and in features of its minute fruits. These differences are apparent when the two are seen growing together in greenhouses. The fruits of these plants, when ripe, adhere to other objects and the species has probably originated from such fruits brought to Bermuda by a migratory bird, adhering to its feet or plumage, the plant becoming differentiated through isolation.

The species was first described by Stewardson Brown, in the Proceedings of the Academy of Natural Sciences of Philadelphia 1909: 490. Ja. 1910. It was referred to *P. obtusifolia* (L.) Dietr., by Reade and by Lefroy, and to *P. magnoliaefolia* (Jacq.) A. Dietr., by Hemsley and by Verrill, somewhat doubtfully. Mr. Brown thought it nearest to *P. magnoliaefolia microphylla* Dahlst., of West Indian mountains. Fawcett and Reudle erroneously include it in *P. crassicaulis* (Fl. Jamaica 3: 8).

Peperomia arifòlia Miq., PELTATE PEPEROMIA, Brazilian, grown in greenhouses and sometimes on shaded rock-work, has broadly ovate, peltate, acute or acuminate, long-petioled, white-veined leaves 2′–4′ long, its spikes often 5′ long.

Order 3. SALICÀLES.

Trees or shrubs, with imperfect small flowers in aments. Sepals and petals none. Leaves simple. Fruit a many-seeded capsule. Seeds with a tuft of hairs at one end.

Family 1. SALICÀCEAE Lindl.

WILLOW FAMILY.

Dioecious trees or shrubs with light wood, bitter bark, brittle twigs, and alternate stipulate leaves, the stipules often minute and caducous. Flowers solitary in the axil of each bract. Staminate flowers consisting of from one to numerous stamens inserted on the receptacle, subtended by a gland-like or cup-shaped disk; anthers 2-celled, the sacs longitudinally dehiscent. Pistillate aments sometimes raceme-like; pistillate flowers of a 1-celled ovary subtended by a minute disk; placentae 2–4, parietal; ovules usually numerous, anatropous; stigmas 2–4, simple or 2–4-cleft. Seeds small or minute, provided with a dense coma of long, mostly white, silky hairs. Endosperm none. Cotyledons plano-convex. Radicle short. The family includes only the 2 following genera, consisting of 200 species or more, mostly natives of the north temperate and arctic zones. There are no native nor naturalized species of this relationship in the Bermuda flora.

Salix babylónica L., WEEPING WILLOW, brought to Bermuda about 1830, is a large tree with slender drooping branches and deciduous lanceolate leaves 4′–7′ long, native of Asia; it is occasional in wet soil along fresh-water marshes. Trees 30° high were seen in Pembroke Marsh in 1914.

Salix chilénsis Molino [*S. Humboldtiana* Willd.], CARACAS WILLOW, HUMBOLDT'S WILLOW, a small South American tree with erect branches and smaller evergreen leaves, is planted for interest.

Populus itálica Moench, LOMBARDY POPLAR, European, with large deltoid leaves and nearly upright branches, recently introduced, suckers freely and grows rapidly in wet grounds. The aments (catkins) of *Populus* differ from those of *Salix* by the floral bracts being fimbriate or lacerate, and the staminate flowers having many stamens. Reade notes that the WHITE POPLAR (*Populus alba* L.), also European, was said to grow at Camden prior to 1883, and it is mentioned by Jones in 1873.

Order 4. MYRICÀLES.

Shrubs or trees, with simple leaves and small monoecious or dioecious flowers in aments. Perianth none. Ovary 1-celled; style short; stigmas 2. Ovule erect, orthotropous. Endosperm none. Only one family.

Family 1. MYRICACEAE Dumort.

BAYBERRY FAMILY.

Leaves alternate, mostly coriaceous and aromatic. Flowers solitary in the axils of the bracts. Staminate flower with 2–16 (usually 4–8) stamens inserted on the receptacle; filaments short; anthers ovate, 2-celled, the sacs longitudinally dehiscent. Ovary subtended by 2–8 bractlets; stigmas [illegible]

Fruit a small drupe or nut, the exocarp often waxy. Seed erect. Cotyledons plano-convex. Radicle very short. Two genera and some 35 species of wide geographic distribution.

1. MYRÌCA L.

Leaves entire, dentate or lobed, mostly resinous-dotted, fragrant. Staminate aments oblong or narrowly cylindric, expanding before or with the leaves. Stamens 4–8. Pistillate aments ovoid or subglobose; ovary subtended by 2–4, mostly short bractlets. Drupe globose or ovoid, its exocarp waxy. [Ancient Greek name of the Tamarisk.] About 33 species, natives of Europe, America and Asia. Type species: *Myrica Gale* L.



1. Myrica cerífera L. WAX-MYRTLE. CANDLEBERRY-MYRTLE. (Fig. 113.) A low slender dioecious tree, up to 25° high, with a trunk 1° thick, or usually a shrub 3°–7° high, the bark gray, nearly smooth. Leaves narrow, oblong or oblanceolate, mostly acute, entire or sparingly dentate, narrowed at the base, fragrant, short-petioled, dark green above, paler and sometimes pubescent beneath, resinous, 1′–3½′ long, unfolding with or before the aments; staminate aments cylindric; pistillate aments short, oblong; ripe drupes globose, bluish white, waxy, tipped with the base of the style, long-persistent. [*M. punctata* of Rein.]

Common on hillsides and along marshes. Native. Southeastern United States and West Indies. Flowers in spring and early summer. Its fruits, protected by the layer of wax, may have reached Bermuda by floating.

Order 5. JUGLANDÀLES.

Trees with alternate pinnately compound leaves, and monoecious bracteolate flowers, the staminate in long drooping aments, the pistillate solitary or several together. Staminate flowers consisting of 3–numerous stamens with or without an irregularly lobed perianth adnate to the bractlet, very rarely with a rudimentary ovary. Anthers erect, 2-celled, the sacs longitudinally dehiscent; filaments short. Pistillate flowers bracted and usually 2-bracteolate, with a 3–5-lobed (normally 4-lobed) calyx or with both calyx and petals, and an inferior 1-celled or incompletely 2–4-celled ovary. Ovule solitary, erect, orthotropous; styles 2, stigmatic on the inner surface. Fruit a drupe with indehiscent or dehiscent, fibrous or woody exocarp (husk; ripened calyx; also regarded as an involucre),

enclosing the bony endocarp or nut which is incompletely 2–4-celled. Seed large, 2–4-lobed. Endosperm none. Cotyledons corrugated, very oily. Radicle minute, superior. Only one family.

Family 1. **JUGLANDÀCEAE** Lindl.

WALNUT FAMILY.

Characters of the order. Six genera and about 35 species, mostly of the warmer parts of the north temperate zone.

Juglans règia L., ENGLISH WALNUT, has occasionally been planted; its nut has a nearly smooth shell.

Juglans nìgra L., BLACK WALNUT, North American, is recorded by Lefroy as having been represented by one or two specimens at Par-la-Ville, Hamilton, and by H. B. Small at Rosebank. Its nut has a rough corrugated shell.

A walnut tree at Mount Hope, about 30° high, apparently a hybrid between the two preceding, produced nuts abundantly in 1914.

Hicoria Pecán (Marsh.) Britton, PECAN, North American, a large tree, with nearly glabrous mature leaves of 11–15 falcate, lanceolate, acuminate leaflets 2′–6′ long, with pendulous sterile aments, oblong fruits 1′–2′ long, the thin husk splitting into 4 valves, the smooth sweet-seeded nuts pointed, has occasionally been planted. A tree about 50° high may be seen at St. Georges, and another nearly as large, about 40 years old, at Fencote, Hamilton.

Order 6. **FAGÀLES.**

Trees or shrubs, with small monoecious or rarely dioecious flowers in aments, or the pistillate ones subtended by an involucre, which becomes a bur or cup in fruit. Calyx usually present. Corolla none. Endosperm none.

Family 2. **FAGÀCEAE** Drude.

BEECH FAMILY.

Trees or shrubs. Leaves alternate, petioled, pinnately veined, the stipules, if any, deciduous. Flowers small, monoecious, the staminate in drooping, slender aments, or capitate, the pistillate subtended by an involucre of partly or wholly united bracts, which becomes a bur or cup. Staminate flowers with a 4–7-lobed perianth and 4–20 stamens, filaments slender, distinct, simple; anther-sacs longitudinally dehiscent. Pistillate flowers with a 4–8-lobed urn-shaped or oblong perianth, adnate to the 3–7-celled ovary; ovules 1 or 2 in each cavity, only 1 in each ovary ripening, pendulous, anatropous; styles as many as the cavities of the ovary, liberty. Fruit a 1-seeded nut, with a coriaceous or somewhat bony exocarp. Testa thin. Cotyledons large, fleshy, often rugose; radicle short. About 5 genera and 400 species, of very wide geographic distribution.

QuercusRòbur L., ENGLISH OAK, European, planted in Pembroke Churchyard, was seen there in 1914, as a tree about 10° high, with a trunk 12′ in circumference just above the base. Its leaves are glabrous, nearly sessile, 4–7-

long, obovate in outline with 3 or 4 obtuse lobes on each side; the acorns are ovoid, about 1′ long, borne in cups about 3″ high.

Other kinds of oaks, formerly grown in Bermuda, are known to me only by the record of Lefroy, of an oak, supposed to be a White Oak (*Quercus alba* L.), North American, at Par-la-Ville, prior to 1877; by H. B. Small of the same species at Rosebank, well remembered by Dr. Bluck, which had disappeared before 1914; of three other North American oaks planted by Lefroy at Mt. Langton, but made no growth during five years, and not there in 1913; and by Reade's statement, published in 1883, that *Quercus nigra* L., also North American, was said to grow at Richmond, this species also mentioned by Jones in his list of 1873.

Order 7. URTICÀLES.

Trees, shrubs or herbs, the flowers with a calyx but without corolla, small, not borne in aments, monoecious, dioecious or polygamous; ovary 1-celled, superior.

Fruit not an achene; trees, shrubs or herbs; ovule pendulous.
Trees with alternate leaves, the sap not milky. Fam. 1. ULMACEAE.
Trees with alternate leaves and milky sap. Fam. 2. MORACEAE.
Fruit an achene; herbs with small clustered greenish flowers, ovule erect or ascending. Fam. 3. URTICACEAE.

Family 1. **ULMÀCEAE** Mirbel.

ELM FAMILY.

Trees or shrubs, with alternate simple serrate petioled pinnately veined stipulate leaves, the stipules usually fugacious. Flowers small, monoecious, dioecious, perfect or polygamous, clustered, or the pistillate solitary. Perianth 3–9-parted or of 3–9 distinct sepals. Petals none. Stamens in our species as many as the perianth-lobes or sepals and opposite them; filaments straight; anthers ovate or oval, longitudinally dehiscent. Ovary 1-celled (rarely 2-celled), mostly superior; ovule solitary, pendulous, anatropous or amphitropous; styles or stigmas 2. Fruit a samara, drupe or nut. Endosperm of the seed little or none. Embryo straight or curved; cotyledons mostly flat. About 13 genera and 140 species, widely distributed in temperate and tropical regions.

Drupes stalked, solitary in the leaf-axils. 1. *Celtis.*
Drupes cymosely clustered in the leaf-axils. 2. *Trema.*

1. **CÈLTIS** [Tourn.] L.

Trees or shrubs, with serrate or entire pinnately veined or in some species 3–5-nerved leaves, and polygamous or monoecious (rarely dioecious?) flowers, borne in the axils of leaves of the season, the staminate clustered, the fertile solitary or 2–3 together. Calyx 4–6-parted or of distinct sepals. Filaments erect, exserted. Ovary sessile. Stigmas 2, recurved or divergent, tomentose or plumose. Fruit a small ovoid or globose drupe, the exocarp pulpy, the endocarp bony. Seed-coat membranous. Embryo curved. [Name ancient, used by Pliny for an African Lotus-tree.] About 60 species, natives of temperate and tropical regions. Type species: *Celtis australis* L.

1. Celtis mississippiénsis Bosc. SOUTHERN HACKBERRY. (Fig. 114.) A tree, reaching a height of 50° with a trunk up to 20′ in diameter, the bark gray, rough and warty. Leaves ovate to lanceolate, firm, entire or with a few low sharp teeth, or those of shoots strongly serrate, 3-nerved and prominently pinnately veined, glabrous, long-acuminate at the apex, inequilateral, 4′ long or less; drupe purple-black, about 3″ long. [*C. occidentalis* of Jones, Reade, Hemsley, Verrill and Moore.]

Rocky woods, Paynter's Vale, Walsingham and Abbot's Cliff. Recorded by Lefroy as growing also, prior to 1877, about the parsonage, Southampton. Native. Southeastern United States. Flowers in spring, the fruit ripe in autumn. Its seeds were probably brought to Bermuda by a bird.



Celtis Smàllii Beadle, SMALL'S HACKBERRY, of the southeastern United States, occasionally planted, has thinner strongly serrate leaves.

2. TRÈMA Lour.

Tall shrubs or trees, unarmed, usually pubescent. Leaves alternate, toothed, 3-nerved at the base, equilateral or only slightly inequilateral, short-petioled, the stipules lateral. Flowers small, greenish, in axillary cymes. Sepals of pistillate flowers induplicate-valvate, those of the perfect flowers imbricated. Stamens 4 or 5. Stigmas 2, entire. Drupe ovoid to globose. [Name unexplained.] Some 30 tropical species. Type species: *T. cannabina* Lour.



1. Trema Lamarckiàna (R. & S.) Blume. LAMARCK'S TREMA. [Fig 115.] A tree, up to 25° high, the trunk sometimes 13′ in diameter, or more often a shrub 5°–10° high, the twigs slender, rough-pubescent. Leaves ovate to lanceolate, short-petioled, 2′ long or less, very rough on the upper side, 3-nerved at the base, reticulate-veined and finely tomentose beneath; flowers only about 1″ wide, the staminate [illegible] the pistillate short-stalked; fruit about 1½″ long, smooth. [*Celtis Lamarckiana* R. & S.; *Sponia Lamarckiana* [illegible]]

Rocky [illegible] Tree [illegible] Cumberland and Almshouse Hills. Native. Florida, West Indies. [illegible] only [illegible] to Bermuda by a bird.

Family 2. **MORÀCEAE** Lindl.

MULBERRY FAMILY.

Trees, shrubs or herbs, mostly with milky sap, petioled stipulate leaves, and small monoecious or dioecious axillary clustered flowers, or the pistillate flowers solitary in some genera. Calyx mostly 4–6-parted. Petals none. Staminate flowers panicled, spicate or capitate, the stamens as many as the calyx-segments. Pistillate flowers capitate, spicate or cymose. Ovary superior, 1-celled in our genera. Ovule solitary, pendulous, anatropous. Styles 1 or 2. About 55 genera and 925 species, widely distributed.

Flowers in spike-like clusters; fruit a syncarp. 1. *Morus.*
Flowers in a hollow receptacle; fruit a syconium. 2. *Ficus.*

1. **MÒRUS** [Tourn.] L.

Trees or shrubs, with milky sap, alternate dentate and often lobed, 3-nerved leaves, fugacious stipules, the pistillate spikes ripening into a succulent aggregate fruit. Staminate flowers with a 4-parted perianth, its segments somewhat imbricated, and 4 stamens, the filaments inflexed in the bud, straightening and exserted in anthesis. Pistillate flowers with a 4-parted persistent perianth, which becomes fleshy in fruit, a sessile ovary, and 2 linear stigmas. Fruiting perianth enclosing the ovary, the exocarp succulent, the endocarp crustaceous. [Ancient name of the mulberry.] About 10 species, of the northern hemisphere. Type species: *Morus nigra* L.

Mature leaves pubescent beneath; fruit purple. 1. *M. rubra.*
Mature leaves glabrous; fruit black. 2. *M. nigra.*



1. Morus rùbra L. RED MULBERRY. (Fig. 116.) A tree, 25° high or more, the bark brown and rough. Leaves ovate or nearly orbicular, scabrous above, pubescent beneath, or when young almost tomentose, acuminate at the apex, rounded, truncate or cordate at the base, serrate-dentate or 3–7-lobed, 3′–8′ long; staminate spikes drooping; pistillate spikes spreading or pendulous in fruit, 1′–1½′ long, 4″–5″ in diameter, about 1′ long, slender-peduncled, dark purple-red or nearly black, delicious.

Rocky woodlands, Walsingham, now rare, or perhaps exterminated. Introduced. Eastern United States. Flowers in spring. Occasionally planted for its fine fruit.

Morus álba L., WHITE MULBERRY, of Europe and Asia, and naturalized in the United States, is occasionally planted. It is a tree with thin broadly ovate, pointed, coarsely toothed leaves 3′–8′ long, glabrous, except for some hairs in the axils of the veins beneath, often variously lobed, the white fruit ½′–¾′ long.

2. Morus nigra L. BLACK MULBERRY. (Fig. 117.) A tree, up to 60° high, with puberulent twigs and young foliage. Leaves thin, ovate, 2′–6′ long, short-acuminate, serrate, undivided or 2–3-lobed, rounded or cordate at the base, becoming glabrous; petioles ¼–½ as long as the blades; staminate spikes cylindric, 5″–10″ long, longer than the peduncles; pistillate spikes oval, 2″–4″ long, shorter than the pubescent peduncles; fruit oval-oblong, 5″–10″ long, black when mature.

Thickets, roadsides and about houses. Naturalized from Europe. Flowers in spring.

Morus multicaùlis Perr., CHINESE MULBERRY, was introduced about 1841 for feeding silkworms; it is a shrub or small tree with thin nearly smooth lobed leaves, which has not perpetuated itself.



2. FÌCUS [Tourn.] L.

Woody plants, mostly large trees, with milky sap, weak wood, and alternate leaves with interpetiolar stipules. Flowers minute, wholly enclosed in receptacles, the staminate with 1, 2 or 3 stamens with short, stout filaments, the pistillate with a sessile 1-celled ovary, the style lateral. [Latin, fig.] Some 600 species, of tropical and warm regions, the following typical.



1. Ficus Carìca L. EDIBLE FIG. (Fig. 118.) A shrub or small tree 6°–18° tall, the stems sometimes clustered. Leaf blades very scabrous-pubescent, firm, leathery, suborbicular or oval in outline, truncate or cordate at the base, palmately 5–7-lobed; lobes coarsely toothed or again lobed; petioles densely pubescent, about ½ as long as the blades; fruit obovoid, 1′–3½′ long.

Specimens after fifty years of cultivation [illegible] of the Mediterranean Region. While cultivated in many countries for the valuable fruit and often brought to the seeds and extensively known for its food up to a remote period.

Ficus elástica Roxb., India Rubber Fig. Asiatic, a large rapidly growing tree with broad entire lustrous dark green, smooth, many-veined leaves, is commonly planted for shade and for ornament; there is a very large specimen at Par-la-Ville, Hamilton. The race with variegated foliage is occasionally grown.

Ficus aùrea Nutt., Golden Fig, native of Florida, Cuba and the Bahamas, has oblong to narrowly obovate or ovate leaves 4′ long or less and small yellowish to red fruits, sessile on the twig; a fine tree at Mt. Langton.

Ficus lyràta Warb., Lyrate-leaved Fig, African, is a tree with coriaceous, obovate strongly few-veined leaves 10′–15′ long, 6′–10′ wide, narrowed at or below the middle, cordate at the base, with short stout petioles, the obovoid figs nearly 1′ long, was grown at Sunny Lands in 1914.

Ficus padifòlia H.B.K., Narrow-leaved Fig, Central American, has oblong-lanceolate, acuminate leaves 2½′–4′ long, narrowed at the base and slender-petioled, its fruit short-stalked, subglobose figs about 4″ in diameter. A tree was seen at the Agricultural Station and another at Orange Valley in 1914.

Ficus benghalénsis L., Banyan, Asiatic, is a large tree, described as becoming up to 100° high, with broadly ovate, coriaceous, strongly few-veined leaves 4′–7′ long, rounded or short-pointed at the apex, rounded or subcordate at the base, its subglobose, sessile fruit 6″–8″ in diameter. A fine specimen, about 60° high, stands in a corner of the Public Garden, St. George's.

Ficus auràta Miq., recorded by Lefroy as planted at Mt. Langton in 1875, and healthy in 1877, does not appear to exist there at present.

Ficus lentiginòsa Vahl, the large Wild Fig tree growing at Montrose, erroneously known in Bermuda as "Banyan," is, apparently, this widely distributed tree of the West Indies; it has short-stalked subglobose fruit 3″ long; its smooth ovate, petioled leaves about 4′ long seem just the same as those of *F. lentiginosa*. The Montrose tree in 1914 was about 25° high, its branches widely spreading over a circle some 75° in diameter, with many aerial roots.

Ficus púmila L., Creeping Fig, Asiatic, a small-leaved vine, creeping on walls by aerial roots, sending out horizontal branches with larger ovate or elliptic leaves 2′–3′ long, its fruit about 2′ long, obovoid, is planted for ornament and interest; the fruit is borne on the branches which bear the larger leaves.

Cecropia peltàta L., Trumpet-tree, West Indian, is a conspicuous tree up to 50° high, with hollow, septate trunk, the large, peltate, 5–9-lobed leaves 1°–2° broad, green above, white-tomentose beneath, the small dioecious flowers in clustered aments 1′–2′ long; a fine specimen at Bellevue.

Toxylon pomìferum Raf. (*Maclura aurantiaca* Nutt.), Osage Orange, North American, a small thorny tree, with glossy ovate or oblong pointed leaves, the fruit a tubercled yellow syncarp often 6′ in diameter, has occasionally been planted for hedges, as at Beverley, Paget.

Artocarpus incìsa L., Breadfruit, Polynesian, with large pinnately lobed leaves, and an immense edible syncarp, a very important food in tropical regions, has been planted at times, but did not become luxuriant.

Artocarpus integrifòlia L., Jackfruit, East Indian, is recorded by Lefroy as growing about 1875 at Par-la-Ville, Hamilton, and mentioned also by Verrill and by Jones, but I have been unable to learn of any tree in Bermuda now.

Artocarpus Lakoòcha Roxb., Lakoocha, Indian, a large spreading tree, with velvety young twigs, elliptic to obovate, petioled, rounded or abruptly acuminate leaves 4′–8′ long, smooth above, finely pubescent and reticulate-veined beneath, the minute flowers borne in dense heads on the twigs, the staminate oblong, about 1′ long, the pistillate globose, the edible fruit 2′–3′ in diameter, is represented by a tree about 35° high, near Hungry Bay.

Chlorophora tinctòria (L.) Gaudich. (*Maclura xanthoxylum* Endl.), Fustic, West Indian, was recorded by Lefroy as growing in Paget gardens; he cites the name "Tamarind Plum" as applied to it, as does Verrill.

Conocephalus violàceus (Blanco) Merrill, Violet Conocephalus, of the Philippine Islands, a fine plant of which existed at Bellevue in 1914, is a purplish-violet, glabrous vine, climbing by aerial roots, with long-petioled, elliptic, obtuse leaves 6′–10′ long, the minute, 4-parted, greenish flowers in panicled heads about 3″ in diameter. [*Procris violacea* Blanco.]

Family 3. **URTICÀCEAE** Reichenb.

Nettle Family.

Herbs (some tropical species shrubs or trees), with watery sap, mostly stipulate simple leaves, and small greenish dioecious, monoecious or polygamous flowers, variously clustered. Calyx 2–5-cleft, or of distinct sepals. Petals none. Stamens in the staminate flowers as many as the lobes or segments of the calyx (sepals) and opposite them, the filaments inflexed and anthers reversed in the bud, straightening at anthesis. Ovary superior, 1-celled; style simple; ovule solitary, erect or ascending, orthotropous, or in some genera partly amphitropous. Fruit an achene. Endosperm oily, embryo straight. About 40 genera and 550 species of wide distribution.

Herbs with stinging hairs. 1. *Urtica.*
Herbs without stinging hairs.
  Flower-clusters not involucrate; leaves mostly opposite.
    Pistillate calyx 3-parted or of 3 sepals. 2. *Pilea.*
    Pistillate calyx 2-4-toothed or entire. 3. *Boehmeria.*
  Flower-clusters involucrate by leafy bracts; leaves alternate. 4. *Parietaria.*

1. **URTICA** [Tourn.] L.

Herbs, with stinging hairs, 3–7-nerved petioled dentate or incised leaves, and distinct or connate stipules. Flowers small and numerous, axillary, cymose-paniculate, spicate or glomerate, dioecious, monoecious or androgynous. Staminate flowers with a deeply 4-parted calyx and 4 stamens. Pistillate calyx 4-parted, the segments unequal; ovary straight; stigma sessile or nearly so; ovule erect, orthotropous. Achene compressed, enclosed by the calyx. Seed coat thin; endosperm little; cotyledons broad. [The ancient Latin name.] About 30 species of wide distribution. Type species: *Urtica dioica* L.

Spikes short, the staminate and pistillate flowers intermixed. 1. *U. urens.*
Spikes long, the upper staminate, the lower pistillate. 2. *U. membranacea*



1. Urtica ùrens L. Stinging Nettle. Small Nettle. (Fig. 119.) Annual, stem 6′–18′ high, stinging-bristly. Leaves thin, glabrous or very nearly so, elliptic, oval or ovate, deeply incised or sometimes doubly serrate, 3–5-nerved, ¾′–3′ long, slender-petioled; stipules short; flower-clusters oblong, short, rather dense.

Recorded as Bermudian by Michaux, Reade and Hemsley. Naturalized from Europe. Naturalized in both eastern and western North America. The plant has not been observed in Bermuda recently.



2. Urtica membranàcea Poir. THIN-LEAVED NETTLE. (Fig. 120.) Annual, sparingly stinging-bristly; stem slender, weak, ascending, 6′–3° long. Leaves slender-petioled, thin, coarsely-dentate, the lower broadly ovate or orbicular, obtuse or acutish at the apex, rounded or subtruncate at the base, ½′–1½′ wide, the upper ovate or lanceolate, acute or acuminate at the apex; stipules lanceolate-subulate; spikes elongated, the upper staminate, the lower pistillate.

Common in waste grounds, introduced from Europe. Flowers from spring to autumn. [*U. chamaedroides* of Hemsley.]

Urtica dioica L., GREAT NETTLE, European, a tall perennial species with compound flower-clusters recorded as Bermudian by Rein, Jones, Reade, Lefroy, H. B. Small and Hemsley, has not been found by recent collectors.

2. PÌLEA Lindl.

Herbs, with opposite petioled mostly 3-nerved leaves, connate stipules, and small monoecious or dioecious flowers in axillary clusters. Staminate flowers mostly 4-parted (sometimes 2- or 3-parted) and with a rudimentary ovary. Pistillate flowers 3-parted, the segments in most species unequal, each subtending a staminodium in the form of a concave scale; ovary straight; stigma sessile, penicillate. Achene compressed. Seed-coat thin. Endosperm scanty or none. [The name is with reference to the cap-like larger sepal.] About 150 species, chiefly in the tropics, most abundant in tropical America. Type species: *Pilea muscosa* Lindl.

Glabrous; leaves entire, 2″–5″ long, elliptic to oblanceolate. 1. *P. microphylla.*
Pubescent; leaves crenulate, 5″–8″ long, suborbicular. 2. *P. nummulariaefolia.*



1. Pilea microphýlla (L.) Liebm. ARTILLERY PLANT. LACE PLANT. (Fig. 121.) Annual or biennial, slender, glabrous. Stems erect or ascending, or sometimes creeping at the base, 2′–12′ long, fleshy, simple or mostly branched; leaves elliptic or oblanceolate, 2″–5″ long, acute or acutish at the apex, entire, attenuate at the base, transversely wrinkled; petioles filiform, shorter than the blades; flower-clusters very small, shorter than the petioles; sepals ovate, very thin, acutish; achenes oblong, lenticular. (*P. serpyllifolia* of Lefroy; *Parietaria microphylla* L.)

Roadsides, walls and waste grounds. Naturalized from the West Indies. Native in southern Florida and throughout tropical America. Flowers nearly throughout the year. Commonly planted as a border in flower-gardens, and grown in vases; both thin-leaved and thick-leaved races are grown.

2. Pilea nummulariaefòlia (Sw.) Wedd. ROUND-LEAVED PILEA. (Fig. 122.) Perennial, pubescent; stems creeping or pendent, often 1° long or more, the branchis 1′–5′ long. Leaves suborbicular, 5″–8″ broad, 3-nerved, crenulate, pubescent with long translucent hairs, the linear raphides numerous and prominent (under a lens) on the under side; petioles slender, somewhat shorter than the blades; flower-clusters very small, in the upper axils. (*Urtica nummulariaefolia* Sw.)

In lawns, Harrington House and Orange Valley. Naturalized. Native of the West Indies.



Pilea grandifòlia (L.) Blume, LARGE-LEAVED PILEA, Jamaican, seen in the garden at Mt. Hope in 1914, is erect, glabrous, 1°–2½° high, with long-petioled ovate to elliptic, serrate leaves 3′–6′ long, the numerous minute flowers in terminal panicles.

3. **BOEHMÈRIA** Jacq.

Perennial stingless herbs (some tropical species shrubs or even trees), with petioled 3-nerved leaves, distinct or connate stipules, and small monoecious or dioecious flowers, glomerate in axillary spikes or heads. Staminate flowers mostly 4-parted, or the calyx of 4 distinct sepals, usually with a rudimentary ovary. Pistillate calyx tubular or urn-shaped, enclosing the ovary; stigma subulate. Achene enclosed by the pistillate calyx. [In honor of Georg Rudolph Boehmer, 1723–1803, professor in Wittenberg.] About 50 species, mostly of tropical regions. Type species: *Boehmeria ramiflora* Jacq.



1. Boehmeria cylíndrica (L.) Willd. FALSE NETTLE. [Fig. 123.] A perennial rough erect branching herb, 1°–3° tall. Stem stiff; leaves ovate, ovate-oblong or ovate-lanceolate, thin, slender-petioled, opposite, or some alternate, coarsely crenate, 1′–1½′ wide; petioles shorter than the blades; stipules distinct; flowers dioecious or androgynous; staminate spikes usually interrupted, the pistillate mostly continuous, ½′–1½′ long; achene ovate-oval, acute, rather less than 1″ long. [*Urtica cylindrica* L.]

Frequent in marshes, North America and West Indies; flowers from winter to autumn. [Introduced in the Old World tropics.]

4. PARIETÀRIA L.

Herbs, with alternate entire 3-nerved petioled leaves, no stipules, and axillary glomerate polygamous flowers, involucrate by leafy bracts. Calyx of the staminate flowers 4-parted or of 4 (rarely 3) distinct sepals. Fertile flowers with a 4-lobed calyx investing the ovary, a short or slender style, and a penicillate stigma. Achene enclosed by the pistillate calyx. [Ancient Latin, referring to the growth of some species on walls.] About 7 species, widely distributed. Type species: *Parietaria officinalis* L.

Leaves obtuse or bluntly acuminate; bracts linear; native species. 1. *P. floridana.*
Leaves acute to acuminate; bracts ovate; introduced. 2. *P. officinalis.*



1. Parietaria floridàna Nutt. RED PELLITORY. (Fig. 124.) Annual, slender, finely but often densely puberulent. Stems ascending or spreading, 4″–20″ long, often much branched; leaves thin, flaccid, numerous, usually ovate to subrhombic, 2′ long or less, blunt at the apex or sometimes short-acuminate but obtuse, entire, mostly obtuse at the base; petioles filiform; bracts of the involucre linear or linear-lanceolate, 2″ long, acute; sepals lanceolate, thin, acute or acutish; achenes ovoid, shining, [*P. debilis floridana* Nutt.; *P. debilis* of Rein, Hemsley, H. B. Small and Moore; *?P. pennsylvanica* of Hemsley.]

Common in sandy soil and rocky shaded situations. Native. Flowers nearly throughout the year. Southeastern United States. Its seeds probably transported to Bermuda by the wind.



2. Parietaria officinàlis L. WHITE PELLITORY. (Fig. 125.) Perennial, tufted, finely pubescent; stems subherbaceous, branched, 1° high or less. Leaves rather thin, ovate to ovate-lanceolate, ½′–2′ long, acutish to acuminate at the apex, mostly obtuse at the base, slender-petioled; involucral bracts ovate to oblong; sepals ovate; achenes about ½″ long. [*P. alba* of H. B. Small.]

On walls and in waste grounds, frequent. Naturalized from Europe. Flowers nearly throughout the year.

Order 9. PROTEÀLES.

Mostly trees or shrubs with alternate leaves, and perfect flowers. Calyx of 4 valvate somewhat united sepals. Corolla none. Stamens 4, borne on the sepals. Pistil 1, the ovary superior, usually oblique. Fruit various.

Only the family *Proteaceae*, which consists of some 50 genera including about 1000 species, natives of the southern hemisphere.

Grevillea robùsta Cunn., SILK OAK, Australian, planted for shade and ornament, is a tree which becomes 50° or 60° high, with 2-pinnately parted, somewhat pubescent leaves about 1° long, the ultimate linear oblong segments acute, the petiole short; the flowers are borne in showy panicled racemes, the sepals oval, the style elongated; the fruits are recurved oblique follicles about 8″ long, tipped with the slender curved or bent style.

Leucadendron argénteum (L.) R. Br., SILVER TREE, of Table Mountain, Cape of Good Hope, has linear-lanceolate sessile leaves, silvery-hairy beneath, and capitate flowers. Lefroy records growing many plants from seeds, none of which survived more than a few months. [*Protea argentea* L.]

Hakea oleifòlia (Smith) R. Br., OLIVE-LEAVED HAKEA, Australian, was taken to Mt. Langton from the New York Botanical Garden in 1913. It becomes a small tree about 20° high, with oblong leaves about 2′ long, and bears flowers in dense axillary clusters. [*Conchium oleiferum* Smith.]

Order 10. SANTÀLALES.

Trees, or shrubs, and a few species herbaceous, many of them parasitic on the roots or branches of other plants, with simple, mostly entire leaves, and inconspicuous, clustered, perfect or imperfect flowers, the corolla present or wanting. Ovary partly or wholly inferior, compound. Stamens as many or twice as many as the sepals or petals. Fruit various. Seeds mostly with fleshy endosperm. A large order, mostly tropical.

Santalum àlbum L., SANDAL-WOOD, East Indian, a tree up to 30° high, with white or yellowish fragrant wood, was seen, in a beautiful specimen, at Bellevue in 1913. It has thin, entire, elliptic leaves 1½′–3′ long, slender-petioled and acute at each end; its small short-pedicelled flowers are in terminal panicles about 1′ long, the obovoid calyx about 1½″ long, with 4 or 5 ovate-triangular lobes, at first white, turning purple.

Order 11. ARISTOLOCHIÀLES.

Herbs or vines, mostly with cordate or reniform leaves and perfect flowers. Calyx inferior, its tube wholly or partly adnate to the ovary. Corolla none. Ovary several- (mostly 6-) celled. Only the following family.

Family 1. **ARISTOLOCHIÀCEAE** Blume.

BIRTHWORT FAMILY.

Acaulescent plants, or with erect or twining stems. Leaves alternate, estipulate. Flowers regular or irregular, sometimes clustered. Calyx-limb 3–6-lobed or irregular. Stamens 6–many, adnate to the pistil; anthers 2-celled, their sacs longitudinally dehiscent. Ovules numerous in each cavity, anatropous, horizontal or pendulous. Fruit a many-seeded 6-celled capsule. Seeds angled or compressed, with a crustaceous testa and usually with a fleshy or dilated raphe; endosperm fleshy, copious; embryo minute. Six genera and about 200 species of wide distribution in tropical and temperate regions.

Aristolochia trilobàta L., LOBED-LEAVED DUTCHMAN'S PIPE, BIRTHWORT, West Indian, a vine, several feet long, with petioled deeply 3-lobed leaves 6′ long or less, solitary, peduncled, axillary flowers, the lower part of the inflated calyx-limb ovoid, inflated, 6-spurred at the base, about 2′ long, the ovate lip tapering into a long tail-like appendage, is commonly planted, climbing on walls and trees, flowering in summer and autumn.

Aristolochia élegans Masters, ELEGANT DUTCHMAN'S PIPE, Brazilian, occasionally planted, is a long slender glabrous vine, with very broadly ovate, cordate, thin leaves 3′–5′ long, the long-stalked drooping flowers with a greenish tube and a cordate-orbicular limb about 3′ broad, which is dark purple and blotched with white.

Aristolochia argentìna Griseb., ARGENTINE DUTCHMAN'S PIPE, of South America, a slender glabrous vine, seen at the Agricultural Station in 1914, has slender-petioled, broadly ovate, cordate, acute leaves about 2′ long, and irregular brownish-mottled flowers about 1′ long.

Order 12. **POLYGONÀLES.**

Herbs, shrubs, trees or vines. Leaves alternate, or sometimes opposite or whorled, the blades mostly entire; stipules mostly present, usually as a sheath (ocrea). Flowers perfect, monoecious, dioecious or polygamous, in variously disposed clusters. Calyx inferior, of 2–6 more or less united sepals sometimes developing keels or wings, often corolloid. Androecium of 2–9 stamens; filaments often dilated at the base; anthers 2-celled, opening longitudinally. Pistil 2–3-carpellary, the ovary superior, 1-celled; styles 2 or 3, more or less united; stigmas capitate or tufted, rarely 2-cleft; ovule solitary, orthotropous. Fruit a lenticular or 3-angled achene. Seed with horny or mealy endosperm; embryo with incumbent or accumbent cotyledons. Consists of the following family only.

Family 1. **POLYGONACEAE** Lindl.

BUCKWHEAT FAMILY.

Characters of the order. About 40 genera and 800 species, widely distributed.

Herbaceous plants.
  Stigmas tufted. 1. [illegible]
  Stigmas capitate.
    Erect or floating herbs.
      Ocreae cylindric, truncate. 2. [illegible]
      Ocreae oblique. 3. [illegible]
    Twining or trailing vines. 4. [illegible]
Trees or shrubs. 5. [illegible]

1. RÙMEX L.

Perennial or annual, leafy-stemmed herbs, some species slightly woody, the leaves in some mainly basal. Stem grooved, mostly branched, erect, spreading or creeping. Leaves flat or crisped, the ocreae brittle and fugacious, the inflorescence of simple or compound, often panicled racemes. Flowers green, perfect, dioecious, or polygamo-monoecious, whorled, on jointed pedicels. Corolla none. Calyx 6-parted, the 3 outer sepals unchanged in fruit, the 3 inner ones mostly developed into wings, one or all three of which usually bear a callosity (tubercle); wings entire, dentate, or fringed with bristle-like teeth. Stamens 6, filaments glabrous. Style 3-parted; stigmas peltate, tufted; achene 3-angled, the angles usually margined. Embryo borne in one of the faces of the 3-angled seed. [The ancient Latin name.] About 140 species, of wide geographic distribution. Type species: *Rumex Patientia* L. These plants are commonly called Rhubarb in Bermuda.

Sepal-wings entire or erose. 1. *R. crispus.*
Sepal-wings fringed with spine-like teeth.
  Wings ovate or oblong-ovate; tubercles usually 2. 2. *R. pulcher.*
  Wings hastate; tubercle 1. 3. *R. obtusifolius.*

1. Rumex crispus L. CURLED DOCK. (Fig. 126.) Perennial, glabrous, dark green; stem rather slender, erect, 1°–3° tall. Leaves crisped and wavy-margined, the lower oblong or oblong-lanceolate, 6′–1° long, long-petioled, the upper narrowly oblong or lanceolate, short-petioled, all cordate or obtuse at the base, more or less papillose; panicle rather open; racemes simple or compound, by the elongation of the pedicels apparently continuous in fruit; flowers rather loosely whorled; fruiting pedicels 1½–2 times as long as the calyx-wings, jointed near the base; wings cordate, 1½″–2″ long, truncate or notched at base, erose-dentate, or nearly entire, each bearing a tubercle; achene 1″ long, dark brown.



Common in fields, meadows and waste grounds. Naturalized from Europe. Widely naturalized in temperate North America. Flowers in spring.

Rumex sanguineus L., BLOODY DOCK, recorded as Bermudian by Nash and by H. B. Small, but not found by subsequent collectors, has a reticulate only one of the sepal-wings. It is native of Europe and naturalized in the southern United States.



3. Rumex obtusifòlius L. Broad-leaved or Bitter Dock. (Fig. 128.) Perennial, glabrous; stem stout, erect, more or less scurfy above, 2°–4° tall. Lower leaves oblong-lanceolate, 6′–15′ long, long-petioled, all cordate or rounded at the base, obtuse or acute at the apex, the upper lanceolate or oblong-lanceolate, short-petioled, somewhat undulate or crisped; panicle rather open; racemes nearly erect; flowers loosely whorled; pedicels slender, somewhat longer than the calyx-wings, jointed below the middle; wings hastate, 2″–2½″ long, fringed with a few spreading spiny teeth, one of them bearing an oblong tubercle; achene pointed, dark red, its faces concave, its angles slightly margined.

Waste grounds, recorded by Lefroy. Introduced from Europe. Widely naturalized in North America. Flowers in spring and summer. Not found by recent collectors but probably correctly recorded.

2. Rumex púlcher L. Fiddle Dock. (Fig. 127.) Perennial, dark green; stem slender, erect or procumbent, diffusely branched, 1°–3° long, the branches spreading. Leaves oblong, or some of the lower fiddle-shaped, 1′–6′ long, long-petioled, obtuse at the apex, cordate at the base, the lower often purple-veined; upper oblong or oblong-lanceolate, 1′–3′ long, usually narrowed at both ends; petioles more or less pubescent; panicle loose; racemes long, divergent, sometimes reflexed, much interrupted, rather leafy; flowers few in the whorls; pedicels equalling the calyx-wings, jointed at or below the middle; wings ovate or oblong-ovate, 2″ long, truncate at the base, one larger than the others or all three of different sizes, fringed with spine-like teeth, usually two, sometimes one or all three bearing tubercles; achene 1″ long, pointed, reddish, its faces concave.

Waste and cultivated grounds. Naturalized from Europe in Bermuda, as in the southern and western United States. Flowers in spring and summer.



Rumex Acetosélla L., Field Sorrel, Sheep Sorrel, a low European species with halberd-shaped sour leaves, recorded by Lefroy as met with in pastures, has not been found in Bermuda by subsequent collectors. It is widely naturalized in temperate North America. H. B. Small also records it, but his description indicates that he had some other plant in mind, and the record by Lefroy is also open to doubt.

2. **PERSICÀRIA** [Tourn.] Mill.

Annual or perennial often pubescent or glandular caulescent herbs, never twining nor climbing. Leaves alternate, entire, continuous with the ocreae, often glandular-punctate. Ocreae cylindric, naked or ciliate. Racemes spike-like. Ocreolae funnelform. Pedicels rather stout, articulated at the base of the calyx. Calyx more or less colored, often glandular-punctate, investing the achene. Sepals mostly 5, 2 wholly exterior, 2 wholly interior and 1 with one margin interior and the other exterior, none of them winged or keeled. Stamens 4–8; filaments not dilated. Styles mostly 2, sometimes 3, usually partially united; stigmas capitate. Achenes usually black, smooth or granular. Endosperm horny. Cotyledons accumbent. [Name from *Persica*, the leaves resembling those of the Peach.] About 125 species, widely distributed. Type species: *Polygonum Persicaria* L.

1. Persicaria punctàta (Ell.) Small. WATER SMARTWEED. (Fig. 129.) Annual or perennial, mostly glabrous. Stem erect or ascending, 1°–3° long; leaves lanceolate, often oblong-lanceolate, 1′–6′ long, acuminate at both ends, conspicuously punctate, often bearing a few short hairs on the midrib, ciliate; ocreae 5″–7″ long, fringed with rather long bristles; racemes linear, erect, somewhat interrupted below, loosely flowered; ocreolae funnelform, fringed with a few short bristles; calyx greenish, about 1″ long, conspicuously glandular; sepals oblong or ovate, obtuse, punctate; stamens 8; achenes lenticular and slightly gibbous, or 3-angled, about 1″ long, broadly oblong, black, smooth and shining. [*Polygonum punctatum* Ell.; *Polygonum acre* H.B.K., not Lam.]



Frequent in marshes. Native. Temperate North America and the West Indies. Flowers from spring to autumn. Its seeds were probably transported to Bermuda by migratory birds.

3. **FAGOPŸRUM** Gaertn.

Annual or perennial rather fleshy usually glabrous leafy herbs, with erect, striate or grooved stems. Leaves alternate, petioled, hastate or deltoid, with oblique, cylindric or funnelform ocreae. Flowers small, white or green, in terminal or axillary usually paniculate racemes, perfect, borne solitary or several together from each ocreola, slender-pedicelled. Calyx about equally 5-parted, persistent and unchanged in fruit, the segments petaloid, shorter than the achene. Stamens 8; filaments filiform, glabrous. Ovary 1-celled, 1-ovuled; style 3-parted; stigmas capitate. Achene 3-angled. Embryo central, dividing the mealy endosperm into two parts; cotyledons broad. [Greek, beech-wheat, from the similarity of the grain.] About 6 species, native of Europe and Asia. Type species: *Fagopyrum tataricum* L.



1. Fagopyrum Fagopỳrum (L.) Karst. BUCKWHEAT. (Fig. 130.) Annual, glabrous except at the nodes, stem 1°–3° high. Leaves hastate, 1′–3′ long, abruptly narrowed above the middle, acuminate; ocreae brittle and fugacious; racemes mostly panicled, sometimes corymbose, many-flowered, erect or inclined to droop; pedicels as long as the calyx; calyx-segments white or whitish; style-branches deflexed in fruit; achene acute, 2½″ long, about twice as long as the calyx, its faces pinnately-striate when mature, the angles acute, not crested. [*Polygonum Fagopyrum* L.; *F. esculentum* Moench.]

Fields and waste grounds, spontaneous after cultivation. Native of Europe or Asia. Widely cultivated for its edible grain, and considerably grown in Bermuda. Flowers in spring and summer.

4. TINIÀRIA Reichenb.

Annual or perennial unarmed slender vines. Leaves alternate, cordate or hastate. Ocreae oblique. Racemes loosely flowered, often paniculate. Sepals 5, green, white or yellowish, 2 exterior, 2 interior and 1 with one edge interior and one edge exterior, this sepal and the two outer keeled or strongly winged. Pedicels slender, reflexed and articulated. Stamens 8, included; filaments short, converging. Styles 3, short or almost wanting, distinct or rarely united. Achenes 3-angled, included, smooth and shining or granular and dull. Endosperm horny. Cotyledons accumbent. [Latin, referring to the creeping habit.]

About 8 species, of North America and Asia, the following typical.



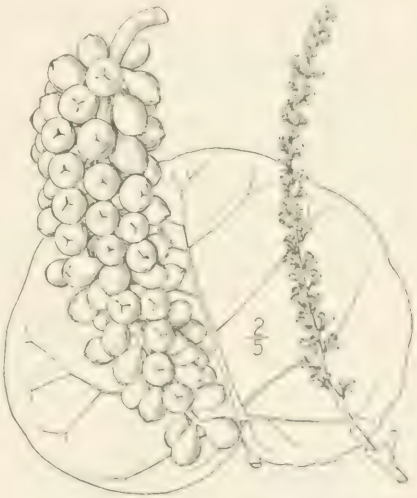
1. Tiniaria Convólvulus (L.) Webb. & Moq. BLACK BINDWEED. (Fig. 131.) Annual, scurfy, dull green or pale green. Stem prostrate or twining, 4′–3½° long, the internodes of the older branches greatly elongating; leaves ovate or ovate-sagittate, ½′–2½′ long, acuminate at the apex, cordate or truncate at the base, somewhat undulate and crisped; ocreae oblique, 1″–2″ long, acute; racemes simple, loosely flowered, interrupted; calyx green, at length 2″ long, closely investing the fruit; sepals oblong, obtuse; stamens 8; achenes 3-angled, obovoid or oblong-obovoid, short-tipped, black. [*Polygonum Convolvulus* L.]

Waste and cultivated grounds, uncommon. Introduced. Widely naturalized in North America. Native of Europe and Asia.

5. COCCOLÒBIS P. Br.

Evergreen shrubs or trees, with erect branched trunks, or rarely high-twining vines, clothed with a very thin bark. Leaves alternate, leathery, entire. Ocreae truncate, membranous, often very small. Flowers perfect, green, on jointed pedicels subtended by small bracts, disposed in spike-like racemes. Sepals 5, herbaceous, nearly equal, little changed at maturity. Stamens 8; filaments slender. Ovary free, 3-angled; styles 3. Ovule erect. Achene ovoid or globose, with a crustaceous or bony pericarp, invested by the accrescent calyx, to which it is sometimes more or less adherent. Seed 3–6-lobed, with a membranous testa. Embryo more or less eccentric in the channeled mealy endosperm, its cotyledons cordate. [Greek, referring to the calyx adhering to the achenes.] About 150 species, mostly tropical, the following typical.

1. Coccolobis uvífera (L.) Jacq. SEA GRAPE. BAY GRAPE. (Fig. 132.) A shrub or tree, 3°–25° high, with a short contorted trunk occasionally reaching a diameter of 2° or more. Branches forming a round head; leaves firm in texture, suborbicular, often broader than long, 2′–8′ in diameter, obtuse or retuse at the apex, undulate, cordate at the base, short-petioled; ocreae funnelform, firm; racemes interrupted, 4′–12′ long; hypanthium campanulate; sepals obovoid-orbicular, whitish, undulate; filaments subulate, red; fruiting racemes dense, resembling bunches of grapes, each drupe-like fruit subglobose, 6″–10″ in diameter, purple or greenish-white, with an astringent juicy pulp and a broadly ovoid, hard achene with a thin reddish pericarp. [*Polygonum uvifera* L.]



Coastal rocks and sands, ascending to the tops of hills along the South Shores; frequent or common. Native Southern Florida, West Indies, continental tropical American coasts. Flowers from spring to autumn. Fruit edible, but not very palatable, doubtless transported to Bermuda by floating.

Coccolobis diversifòlia Jacq., BARBADOES GRAPE-TREE. West Indian, is a small tree 15° high or more, with petioled, ovate to elliptic, acute, pinnately veined leaves 2′–6′ long, slender spikes of small greenish flowers, the reddish fruit about 5″ in diameter; a luxuriant specimen was seen in a garden at the west end of the Causeway in 1913.

Ruprechtia corylifòlia Griseb., HAZEL-LEAVED RUPRECHTIA, South American, a small tree with slender branches, ovate-elliptic, acute, thin, short-petioled leaves 1½′–3′ long, very small, green flowers in slender racemes, the narrow calyx lobes much enlarged in fruit, was shown by two specimens about 13° high at Mount Hope in 1914.

Pleuropterys Zuccarínii Small, JAPANESE KNOTWEED, Japanese, occasionally planted for ornament, is a large perennial herb, 4°–8° high, spreading by rootstocks, with ovate, acuminate leaves 2′–6′ long, and many panicled racemes of small, white flowers. [*Polygonum cuspidatum* Sieb. and Zucc., not of Willd.]

Muehlenbeckia platyclàda (F. v. M.) Lindau, CENTIPEDE PLANT, Polynesian, a shrub up to 10° high, with flat jointed leafless branches, the small green flowers clustered at the joints, is grown in gardens for interest. Reade made a curious error in referring this plant to the genus *Xylophylla* of the Spurge Family, and this was copied by H. B. Small. [*Coccoloba platyclada* F. v. M.; *?Polygonum platyphyllum* of Jones.]

Muehlenbeckia compléxa Meisn., TWINING MUEHLENBECKIA, of New Zealand, a very slender vine up to 6° long, at first finely pubescent, its nearly orbicular, slender-petioled leaves ½′ broad or less, its membranous sheaths about 1½″ long, was grown on a wall at Woodhaven in 1914; the flowers of this plant are very small, greenish and axillary. The plant is wholly different in aspect from the preceding species.

Antigonum lèptopus H. & A., CORALLINA, CORALLITA, CORAL PLANT, Mexican, a slender, climbing herbaceous vine, with small rose-pink or sometimes white flowers, is much grown in gardens for ornament.

Lefroy records that roots of RHUBARB (*Rheum Rhapônticum* L.), introduced in 1872, soon died out. Other attempts to raise this vegetable have been made, but without much success.

Order 13. CHENOPODIÀLES.

Herbs, mostly with perfect flowers. Calyx present. Corolla, if present, polypetalous. Ovary superior. Embryo coiled, curved or annular. Fruit not an achene.

Fruit a utricle.	
Flowers bractless, or, if bracted, the bracts not scarious; sepals green or greenish.	
Plants not climbing nor trailing.	Fam. 1. CHENOPODIACEAE.
Climbing or trailing vines.	Fam. 2. BASELLACEAE.
Flowers bracted, the bracts, and also the sepals, mostly scarious.	Fam. 3. AMARANTHACEAE.
Fruit fleshy, enclosing several carpels; a berry.	Fam. 4. PHYTOLACCACEAE.
Fruit an anthocarp, the persistent base of the corolla-like calyx enclosing a utricle.	Fam. 5. NYCTAGINACEAE.
Fruit a capsule, dehiscent by valves, or teeth.	
Capsule 2-several-celled; petals none.	Fam. 6. AIZOACEAE.
Capsule 1-celled; petals mostly present.	
Sepals 2.	Fam. 7. PORTULACACEAE.
Sepals 5 or 4.	
Sepals distinct; ovary sessile; petals not clawed.	Fam. 8. ALSINACEAE.
Sepals united; ovary stipitate; petals clawed.	Fam. 9. CARYOPHYLLACEAE.

Family 1. CHENOPODIÀCEAE Dumort.

GOOSEFOOT FAMILY.

Annual or perennial herbs, rarely shrubs, with angled striate or terete stems. Leaves alternate or sometimes opposite, estipulate, simple, entire,

toothed or lobed, mostly petioled (in *Salicornia* reduced to mere ridges). Flowers small, green or greenish, regular or slightly irregular, variously clustered, occasionally solitary in the axils. Petals none. Calyx persistent, 2–5-lobed, 2–5-parted or rarely reduced to a single sepal, wanting in the pistillate flowers of some genera. Stamens as many as the lobes or divisions of the calyx, or fewer, and opposite them; filaments slender; anthers 2-celled, longitudinally dehiscent. Disk usually none. Ovary 1-celled; ovule solitary, amphitropous; styles 1–3; stigmas capitate, or 2–3-lobed or divided. Fruit a utricle, with a thin or coriaceous pericarp. Seed vertical or horizontal; endosperm mealy, fleshy or wanting. About 75 genera and 550 species, of wide geographic distribution.

Leafy herbs; endosperm of the seed copious.
  Flowers perfect; calyx 2–5-lobed. 1. *Chenopodium.*
  Flowers imperfect; pistillate calyx none; fruit enclosed in 2 large bractlets. 2. *Atriplex.*
Leafless herbs with opposite branches; no endosperm. 3. *Salicornia.*

1. CHENOPÒDIUM L.

Annual or perennial herbs, with alternate petioled leaves. Flowers small, green, perfect, sessile, bractless, clustered. Calyx 2–5-parted or 2–5-lobed, embracing or enclosing the utricle, its segments or lobes often keeled or ridged. Stamens 1–5; filaments filiform or slender. Styles 2 or 3; seed horizontal or vertical, sometimes in both positons in different flowers of the same species; endosperm mealy; embryo completely or incompletely annular. [Greek, goose-foot, from the shape of the leaves.] About 60 species, mostly weeds, of wide geographic distribution. Type species: ***Chenopodium rubrum*** L.

Embryo of the seed a complete ring; plants not strongly odorous.
  Flowers in dense compound spikes. 1. *C. album.*
  Flowers in loose axillary panicles. 2. *C. murale.*
Embryo an incomplete ring; plants strongly odorous. 3. *C. ambrosioides.*

1. Chenopodium álbum L. LAMB'S QUARTERS. WHITE GOOSE-FOOT. PIG-WEED. (Fig. 133.) Annual; stem usually slender, erect, commonly much branched, 1°–9° tall. Leaves rhombic-ovate or the upper lanceolate, narrowed at the base, 3-nerved, dentate, sinuate or lobed, or the upper entire, 1′–4′ long; spikes terminal and axillary, simple or compound, often panicled; calyx about ½″ broad in fruit, its segments usually completely enclosing the utricle; seed horizontal, black, shining, firmly attached to the pericarp.

In waste places, and cultivated soil; a common weed, naturalized from Europe. Widely naturalized in warm and temperate regions. Flowers from winter to autumn.





2. Chenopodium murâle L. NETTLE-LEAVED GOOSEFOOT. SOWBANE. (Fig. 134.) Annual, somewhat scurfy above; stem 1°–2½° high, leafy to the summit. Leaves rhombic-ovate, thin, bright green, acute or acuminate, sharply and coarsely sinuate dentate, cuneate or subtruncate at the base, slender-petioled, 2′–4′ long; flowers in loose axillary panicles often not longer than the petioles; calyx-segments not entirely enclosing the utricle; seed sharp-edged, horizontal, firmly attached to the pericarp.

Occasional or frequent in waste places. Introduced. Native of Europe. Naturalized in temperate North America and in the West Indies. Flowers from spring to autumn.

3. Chenopodium ambrosioìdes L. MEXICAN TEA. WORMSEED. (Fig. 135.) Annual, glabrous or slightly glandular-pubescent, strong-scented; stem leafy, 2°–3° high angular and grooved. Leaves oblong or oblong-lanceolate, narrowed to a short petiole, repand-dentate, undulate or the upper entire, 1′–4′ long, the upper numerous and smaller; flowers in small dense axillary spikes; calyx usually 3-parted, completely enclosing the fruit; pericarp readily separable from the seed; seed horizontal or vertical, shining. [*C. anthelminticum* L.]



In waste places. Common. Naturalized from tropical America. Flowers in summer and autumn.

Blitum marítimum L., similar to *Chenopodium,* but the calyx becoming fleshy and accrescent, the ripe heads of fruit globose and red, recorded by Reade as rare along waysides by the sea, has not been found by subsequent collectors. It is native of the cooler parts of the north temperate zone. The record is, perhaps, an error for *Atriplex arenaria.*

2. ÀTRIPLEX L.

Herbs or low shrubs, often scurfy-canescent or silvery. Leaves alternate, or some of them opposite. Flowers dioecious or monoecious, small, green, in panicled spikes or capitate-clustered in the axils. Staminate flowers bractless, consisting of a 3–5-parted calyx and an equal number of stamens; filaments

separate or united by their bases; a rudimentary ovary sometimes present. Pistillate flowers subtended by 2 bractlets which enlarge in fruit and are more or less united, sometimes quite to their summits; perianth none; stigmas 2. Utricle completely or partially enclosed by the fruiting bractlets. Seed vertical or rarely horizontal; embryo annular; endosperm mealy. [From a Greek name of orache.] About 130 species, of very wide geographic distribution. Type species: *Atriplex hortensis* L.

1. Atriplex arenària Nutt. SEA-BEACH ATRIPLEX. (Fig. 136.) Annual, pale, densely silvery-scurfy; stem bushy-branched, 4′–15′ high, the branches ascending or decumbent, angular; leaves oblong, entire, short-petioled or sessile, ½′–2′ long, the lateral veins few and obscure; flowers in axillary clusters much shorter than the leaves; fruiting bractlets triangular wedge-shaped, broadest above, 2″–3″ wide, united nearly to the several-toothed summits, their margins entire, their sides reticulated, or sometimes crested or tubercled. [*A. cristata* of Lefroy and of Hemsley; *?Blitum maritimum* of Reade and of H. B. Small.]

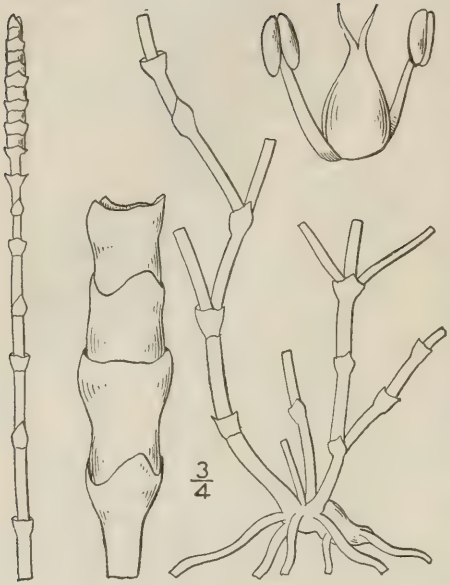


In salt marshes, not abundant, and recorded by Lefroy as found along the North Shores. Native. Eastern United States, Bahamas, Cuba. Transported to Bermuda by floating. Flowers from spring to autumn.

Atriplex horténsis L., GARDEN ORACHE, Tartarian, grown as a substitute for spinach in many countries, was seen at the Agricultural Station in 1913. It has succulent ovate-lanceolate leaves 2½′–4′ long, and flowers in large panicles, the broadly ovate, veiny, subcordate bracts about 5″ broad.

3. SALICÒRNIA L.

Fleshy glabrous herbs, with opposite terete branches, the leaves reduced to mere opposite scales, the flowers sunken 3–7 together in the axils of the upper ones, forming narrow terminal spikes, perfect or the lateral ones staminate. Calyx obpyramidal or rhomboid, fleshy, 3–4-toothed or truncate, becoming spongy, in fruit deciduous. Stamens 2, or sometimes solitary, exserted; filaments cylindric, short; anthers oblong, large; ovary ovoid; styles or stigmas 2. Utricle enclosed by the spongy fruiting calyx, the pericarp membranous. Seed erect, compressed; embryo conduplicate; endosperm none. [Name Greek, salt-horn; from the saline habitat, and horn-like branches.] About 10 species, natives of saline soil, widely distributed in both the Old World and the New. Type species: *Salicornia europaea* L.



1. Salicornia perénnis Mill. WOODY GLASSWORT. MARSH SAMPHIRE. (Fig. 137.) Perennial by a woody rootstock; stem trailing or decumbent, the branches ascending or erect, slender, nearly or quite simple, rather long-jointed, 6′–1½° high. Scales broadly ovate or wider than high, appressed or slightly divergent; fruiting spikes ½′–1½′ long, their joints not longer than thick; flowers all about equally high and about equalling the joints. [*S. ambigua* Michx.; *S. fruticosa* of Lefroy, H. B. Small, Coulter, and Verrill.]

Common in salt marshes, and on coastal rocks and sands. Native. Atlantic and Pacific coast of North America, Bahamas, Cuba, Jamaica, coasts of northern Europe. Transported to Bermuda by floating. Flowers in spring and summer.

Beta vulgàris L., BEET, European, a large-rooted plant of this family, is successfully grown as a garden vegetable in several races. The flowering stem is 2°–3° high, with alternate leaves, the small greenish flowers in panicled spikes.

Family 2. **BASELLÀCEAE** Moq.

MADEIRA-VINE FAMILY.

Somewhat succulent vines, with tuber-bearing rootstocks. Leaves alternate, broad, often cordate, entire. Flowers perfect in narrow racemes. Calyx of 2 sepals, sometimes winged in fruit. Corolla of 5 petals. Stamens 5, borne opposite the petals; filaments sometimes united below. Ovary superior, 1-celled; styles 3, distinct; stigmas entire or cleft. Ovule solitary, campylotropous, erect. Fruit utricular. Seed with a membranous testa. Five genera and about 15 species of tropical distribution, mostly American.

1. **BOUSSINGAÙLTIA** H.B.K.

Vines, with much-branched stems, the leaves rather fleshy. Flowers in axillary and terminal spike-like racemes. Sepals nearly flat, not winged. Petals longer than the sepals. Filaments terete, somewhat enlarged, but not dilated, at the base. Stigmas cleft. Seeds with starchy endosperm. [In honor of Boussingault, a French botanist.] About a dozen species, natives of tropical America, the following typical.

1. Boussingaultia baselloides H.B.K. MADEIRA-VINE. BRIDAL WREATH. (Fig. 138.) A glabrous vine climbing over other plants or on walls. Leaves ovate, 1′–3′ long, acute, entire, abruptly narrowed or subcordate at the base, short-petioled; racemes slender, simple or compound, 2′–6′ long; petals greenish white, oval or elliptic-oval, about 2″ long, spreading during anthesis.

Thickets and walls, escaped from cultivation and naturalized. Native of South America. Flowers in summer and autumn. An attractive vine with many narrow racemes of nearly white fragrant flowers.

Basella rùbra L., RED BASELLA, of tropical Asia, recorded by Jones as grown in Bermuda, is a vine, similar to the Madeira Vine, but with spicate, red or white, sessile flowers, and the seeds have scarcely any endosperm. [*B. cordifolia* Lam.]



Family 3. AMARANTHÀCEAE J. St. Hil.

AMARANTH FAMILY.

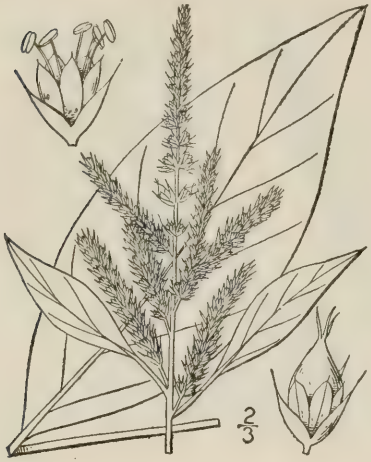
Herbs, some exotic genera low shrubs, with simple mostly entire thin leaves. Flowers small, green or white, bracteolate, variously clustered, usually in terminal spikes or axillary heads. Petals none. Calyx herbaceous or membranous, 2–5-parted, the segments distinct, or united at the base, equal, or the inner ones smaller. Stamens 1–5, mostly opposite the calyx-segments, hypogynous; filaments distinct, united at the base, or into a tube. Ovary 1-celled; ovule solitary in the following genera, amphitropous (several in some tropical genera); stigmas 1–3. Fruit a utricle, circumscissile, bursting irregularly, or indehiscent, 1-seeded in our genera. Seed mostly smooth; embryo annular; endosperm mealy, usually copious. About 40 genera and 475 species, widely distributed, most abundant in warm regions.

Utricle circumscissile; anthers 2-celled. 1. *Amaranthus*
Utricle indehiscent; anthers 1-celled. 2. *Achyranthes*

1. AMARÁNTHUS L.

Annual branched erect or diffusely spreading glabrous or pubescent herbs, with petioled pinnately veined leaves and small scarious persistent or

dioecious green or purplish mostly 3-bracteolate flowers in dense terminal spikes or axillary clusters. Calyx of 2–5 distinct sepals. Stamens 2–5; anthers longitudinally dehiscent. Styles or stigmas 2 or 3. Fruit an ovoid or oblong utricle, 2–3-beaked by the persistent styles. Embryo annular. [Greek, unfading flower, from the dry, unwithering bracts.] About 50 species of wide geographic distribution. Type species: *Amaranthus caudatus* L.



1. Amaranthus hýbridus L. SLENDER PIGWEED. (Fig. 139.) Roughish-pubescent; stem usually slender, erect, 1°–5° tall. Leaves ovate, or the upper lanceolate, acute or acuminate, thin, 2′–6′ long; spikes linear-cylindric, axillary and forming dense terminal panicles, ascending, somewhat spreading or drooping; bracts subulate, twice as long as the 5 oblong acute or cuspidate sepals; stamens 5; utricle scarcely wrinkled. [*A. chlorostachys* Willd.]

A common weed in waste and cultivated grounds. Naturalized from tropical America. Widely naturalized as a weed in temperate North America. Flowers nearly throughout the year.

Amaranthus retroflexus L., ROUGH PIGWEED, American, similar, but with thick ovoid-cylindric flower spikes, is recorded as Bermudian by Reade, H. B. Small and Moore.

Amaranthus spinòsus L., SPINY AMARANTH, with a pair of stout spines in each leaf axil, is recorded by Lefroy as a weed in cultivated ground, and by Hemsley, as found among rubbish by Lane, but it has not been seen in Bermuda by subsequent collectors.

Amaranthus gangéticus L., LOVE-LIES-BLEEDING, Asiatic, sometimes grown for ornament in races with red or purple leaves, is 1°–3° high with erect spikes of glomerate flowers. [*A. melancholicus* L.]

2. ACHYRÀNTHES L.

Decumbent or prostrate herbs. Leaves opposite, entire or nearly so. Flowers perfect, in sessile or peduncled head-like usually white or silvery spikes. Sepals 5, unequal. Stamens 5, the filaments partially united into a cup-like tube; staminodia surpassing the filaments and 1-celled anthers or shorter. Ovary 1-celled; stigma capitate. Ovule solitary. Utricle flattened, indehiscent. Seeds lenticular, smooth. [Greek, straw-flower.] About 100 species, of tropical and subtropical distribution. Type species: *Achyranthes repens* L.

1. Achyranthes marítima (St. Hil.) Standley. BEACH ALTERNANTHERA. (Fig. 140.) Plants glabrous, fleshy. Stems or the branches prostrate, 8′–2½° long, angled, branched; leaves leathery, cuneate to oblong or elliptic, ¾′–2½′ long, obtuse, commonly mucronate, entire, sessile or somewhat petioled; spikes dull straw-colored, 3″–6″ long, sessile, leaving a conspicuous scar when detached; bracts ovate, keeled; calyx ⅓ longer than the bracts; sepals rigid, ovate, acute and slightly awn-tipped, usually 5-nerved, glabrous; staminodia longer than the filaments, cleft or lacerate at the tip. [*Alternanthera maritima* St. Hil.]



Beaches, Long Bird Island, 1908. Southern Florida, Bahamas, South America. Flowers in spring. Transported to Bermuda by floating.

Achyranthes polygonoìdes (L.) R.Br. KNOTWEED ACHYRANTHES, West Indian, recorded by Reade as growing in the Public Park prior to 1883, has spreading stems and branches, spatulate obtuse leaves about 1′ long, and bright white flower-heads ¾′ in diameter, sessile in the axils.

Achyranthes amábilis (Lemaire) Britton, BEAUTIFUL ACHYRANTHES, Brazilian, planted for borders in flower gardens, has oblong or oblong-lanceolate, more or less red-blotched leaves 1′–3′ long. [*Alternanthera amabilis* Lemaire.]

Achyranthes Bettzickiàna (Regel) Britton, BETTZICK'S ACHYRANTHES, also Brazilian and planted for borders, has spatulate to ovate red to green leaves 1′–2′ long, with long margined petioles. [*Telanthera Bettzickiana* Regel.]

Celosia cristàta L., COCKSCOMB, of tropical regions, cultivated in flower gardens, is a stiff, erect annual about 2° high, with glabrous, ovate, petioled leaves 2′–3′ long, cordate at the base, often variegated; its spikes of flowers are confluent into flat crested structures sometimes very broad, red, purple or violet to yellow. It is supposed to be a crested race of *Celosia argentea* L., a common tropical weed.

Iresine Hèrbstii Hook., HERBST'S IRESINE, South American, recorded by Lefroy as grown in Bermuda gardens, is shrubby, 1½°–3° high, with nearly orbicular, slender-petioled, emarginate, purple or red leaves 1′–3′ broad and very small and numerous flowers in panicles.

Family 4. **PHYTOLACCÀCEAE** Lindl.

POKEWEED FAMILY.

Herbs (some tropical species shrubs or trees) with alternate entire mostly estipulate leaves, and perfect regular polygamous or monoecious flowers. Calyx 4–5-parted or of 4 or 5 sepals, its segments or sepals imbricated in the bud. Petals wanting. Stamens as many as the calyx-segments or sepals and alternate with them, or more numerous, hypo-

filaments distinct, or united at the base; anthers 2-celled, the sacs longitudinally dehiscent, often nearly separated. Ovary superior, several-celled in most of the genera; ovules solitary in the cavities, amphitropous. Styles as many as the carpels, short or none; stigmas linear or filiform. Fruit a berry in the following genus. Endosperm of the seed mealy or fleshy. About 22 genera and 110 species, mostly in the tropics.

1. PHYTOLÁCCA L.

Tall perennial herbs, with petioled estipulate leaves, and small flowers in terminal racemes, which by the further growth of the stem become opposite the leaves. Pedicels bracted at the base and often 1–3-bracted above. Calyx of 4 or 5 persistent rounded sepals. Stamens 5–15, inserted at the base of the calyx. Ovary composed of 5–15 distinct or somewhat united carpels. Fruit a depressed-globose 5–15-celled fleshy berry. Seeds 1 in each cavity, erect, compressed; embryo annular in the mealy endosperm. [Name Greek and French, referring to the crimson juice of the berries.] About 24 species, the following typical one of eastern North America, the others tropical.



1. Phytolacca americàna L. POKE. SCOKE. GARGET. (Fig. 141.) A glabrous strong-smelling succulent erect herb, 3°–12° tall, the root large, poisonous, the stem stout, its pith divided into disks. Leaves oblong-lanceolate or ovate-lanceolate, acute or acuminate at both ends, 6′–12′ long; racemes 2′–8′ long; pedicels 2″–6″ long; flowers perfect; calyx white, 2″–3″ broad; stamens 10, slightly shorter than the sepals; ovary green, 10-celled; styles recurved; berry dark purple, 5″–6″ in diameter, very juicy, its 10 carpels conspicuous when dry. [*P. decandra* L.]

Waste grounds in Paget Marsh, 1905. Introduced from temperate North America. Naturalized in Europe. Flowers from spring to autumn.

Rivina hùmilis L., ROUGE PLANT, of tropical America, a low shrub with alternate, entire, petioled ovate to lanceolate leaves 1′–3′ long, the small white flowers racemose, with 4 sepals, the fruit small red berries about 1″ in diameter, was grown at the Agricultural Station in 1914.

Family 5. NYCTAGINÀCEAE Lindl.

FOUR-O'CLOCK FAMILY.

Herbs (some tropical genera trees or shrubs) with simple entire leaves, and regular flowers in clusters, in several of the genera subtended by in-

volucres. Petals none. Calyx inferior, usually corolla-like, its limb 4–5-lobed or 4–5-toothed. Stamens hypogynous; filaments filiform; anthers 2-celled, dehiscent by lateral slits. Ovary enclosed by the tube of the perianth, 1-celled, 1-ovuled; ovule campylotropous; stigma capitate. Fruit a ribbed, grooved or winged anthocarp. About 25 genera and 350 species, of wide geographic distribution, most abundant in America.

Involucre large, calyx-like, its bracts united. 1. *Mirabilis*.
Involucre none; flowers very small, panicled 2. *Boerhaavea*.

1. MIRÀBILIS L.

Perennial herbs, with large tuberous-thickened roots and forking stems. Leaves opposite, somewhat fleshy, petioled, or the upper sessile. Flower solitary or many flowers together in a 5-lobed calyx-like involucre. Calyx colored, its tube elongated, constricted above the ovary, its limb expanding, deciduous. Stamens 5 or 6, unequal; filaments filiform, slender, incurved, united into a fleshy cup at the base. Style filiform. Fruit ribbed. Seed filling the pericarp, to which the testa adheres; endosperm mealy. [Latin, beautiful.] Twenty or more American species, the following typical.

1. Mirabilis Jalápa L. FOUR-O'CLOCK. MARVEL OF PERU. (Fig. 142.) Foliage deep green, glabrous or slightly pubescent. Stem erect, 1°–3° tall, much branched; leaves ovate, acuminate, sometimes sparingly ciliate, entire, truncate or cordate at the base, the petioles about ½ as long as the blades; involucres campanulate, 3″–4″ high, pubescent, 1-flowered, their lobes ovate-lanceolate, twice as long as the tube, acute, bristle-tipped; calyx salverform, 1¼′–2′ long, deep red to purple or white, often more or less blotched, the edge lobed; stamens exserted; fruit ovoid, black, 4″–5″ long, wrinkled-tuberculate, 5-ribbed. [*M. dichotoma* L.; *M. longiflora* of Jones.]



Waste grounds and woodlands. Escaped from cultivation and naturalized. Native of tropical America. Flowers from spring to autumn. Much grown in gardens.

2. BOERHAÀVEA L.

Slender herbs with forking stems and branches, opposite leaves and small panicled minutely bracted flowers on jointed pedicels. Calyx campanulate

to funnelform, its limb 5-lobed. Stamens 1–5, exserted, the slender filaments united at the base. Ovary oblique; style filiform; stigma peltate. Fruit obovoid or clavate, ribbed. [In honor of Hermann Boerhaave, 1668–1738, a celebrated Dutch scientist.] About 50 species, native of warm and tropical regions. Type species: *B. diffusa* L.



1. Boerhaavea erécta L. HOG-WEED. (Fig. 143.) Stem erect or ascending, branched; leaves ovate to deltoid-ovate, sometimes inequilateral, ¾′–3½′ long, apiculate, repand or undulate, acute to cordate at the base, minutely black-dotted on the lower whitish surface; petioles usually about one half as long as the blades or longer; peduncles filiform; flowers 2–6 in a cluster; calyx white to purple, its tube glabrous, the limb campanulate, ½″–¾″ long, sparingly pubescent; stamens exserted; fruit obpyramidal, 2″ long, 5-angled, the grooves transversely wrinkled, the top flat.

Common as a weed in waste and cultivated grounds. Naturalized from tropical America or Southern Florida. Flowers nearly throughout the year.

Bougainvillea spectábilis Willd., PURPLE BOUGAINVILLEA, a high-climbing vine with large purple flowers, spiny stems, and round-ovate pubescent leaves, is extensively planted for ornament about houses and grows luxuriantly. It is native of Brazil.

Bougainvillea glàbra Choisy, RED BOUGAINVILLEA, also Brazilian, similar, but glabrous, and with brick-red flowers, is occasionally planted. It is difficult to propagate.

Torrubia fràgrans (Dum.-Cours.) Standley, FRAGRANT TORRUBIA, West Indian, is a smooth barked tree up to 40° high, with thin, opposite, slender-petioled leaves 3′–4′ long, acuminate at both ends, and small green fragrant flowers in dense terminal clusters, followed by oblong beaked drupes about ½′ long. An elegant specimen, the only one known to me in Bermuda, existed at Admiralty House in 1913. [*Pisonia fragrans* Dum.-Cours.]

Family 6. **AIZOÀCEAE** A. Braun.

CARPET-WEED FAMILY.

Annual or perennial herbs, with watery sap. Stems often branched at the base, the branches radiating, sometimes creeping. Leaves mostly opposite or apparently whorled, simple. Flowers perfect, polygamous or unisexual, regular. Calyx of 4 or 5 sepals. Corolla wanting (in our genera). Stamens 4 or 5, hypogynous or perigynous, or sometimes fewer

or more numerous. Anthers 2-celled. Carpels 2 or several, united. Ovary 2–many-celled or 1-celled by suppression, superior, or somewhat inferior. Styles or stigmas as many as cavities in the ovary. Ovules 1 or many. Fruit a capsule, or rarely berry-like or nut-like. Endosperm copious. Embryo curved. About 22 genera and 500 species, widely distributed.

Calyx not adnate to the ovary; capsule circumscissile. 1. *Sesuvium*.
Calyx adnate to the ovary; fruit indehiscent. 2. *Tetragonia*.

1. SESÙVIUM L.

Fleshy decumbent or prostrate herbs, with opposite leaves and axillary pink or purplish flowers. Stipules none, but the petioles often dilated and connate at the base. Calyx-tube top-shaped, 5-lobed, the lobes oblong, obtuse. Stamens 5–60, inserted on the calyx-tube. Filaments filiform, sometimes united at the base. Ovary 3–5-celled. Styles 3–5, papillose along the inner side. Capsule membranous, oblong, 3–5-celled, circumscissile. Seeds round-reniform, smooth; embryo annular. About 4 species, natives of seacoasts and saline regions, the following typical. [Derivation uncertain.]

1. Sesuvium Portulacástrum L. Sea Purslane. Seaside Purslane. (Fig. 144.) Perennial, fleshy, glabrous. Stems usually diffusely branched, the branches prostrate, often creeping, forming patches often 5°–6° broad; leaves oblanceolate to oblong, ½′–2′ long, acute or acutish, the bases clasping; flowers short-peduncled, solitary in the axils; sepals broadly lanceolate, 3″–5″ long, hooded, purple within, the back prolonged into an appendage; stamens numerous; capsule conic, 4″–5″ long.

Common in salt marshes and on coastal sands. Native. Southeastern United States and West Indies. Doubtless transported to Bermuda by floating. Flowers from spring to autumn. An abundant and characteristic coastal plant.



2. TETRAGÒNIA L.

Herbs, somewhat fleshy, with alternate, estipulate leaves and small axillary flowers. Calyx-tube adnate to the ovary extending beyond it; sepals 3–5. Stamens inserted on the calyx-tube. Ovary 1–several-celled; styles as many as the ovary-cavities. Fruit nut-like, often 4-angled, indehiscent. Seeds reniform; embryo curved. [Greek, four-angled.] About 20 species. Type [illegible] *Tetragonia fruticosa* L.



1. Tetragonia expánsa Murr. NEW ZEALAND SPINACH. (Fig. 145.) Stems prostrate or ascending, rather stout, often 2° long, branched below. Leaves rhombic-ovate, 1′–3′ long, acutish to acuminate at the apex, abruptly narrowed into a petiole shorter than the blade; flowers solitary and nearly sessile in the axils, about 2½″ wide; fruit short-stalked, broadly obovoid, 4-horned, 4″–5″ thick.

Border of mangrove swamp, near Bassett's Cave, Sandys, 1912. Escaped from cultivation and naturalized. Native of New Zealand.

Mesembryanthemum crystallìnum L., ICE PLANT, of Greece, the Canary Islands, South Africa, and found also on the coast of California, has been planted for interest. It is a diffusely procumbent herb, covered with white shining papillae, its ovate to spatulate leaves 1′–4′ long, its small, nearly sessile, axillary flowers white or rose. [*M. glaciale* Haw.]

A species of *Mesembryanthemum*, South African, known as HOTTENTOT'S BREAD, was grown at Wood Haven in 1914.

Family 7. **PORTULACÀCEAE** Reichenb.

PURSLANE FAMILY.

Herbs, rarely somewhat woody, with regular perfect but unsymmetrical flowers. Sepals commonly 2 (rarely 5). Petals 4 or 5, rarely more, hypogynous, imbricated. Stamens hypogynous, equal in number to the petals or fewer, rarely more; filaments filiform; anthers 2-celled, longitudinally dehiscent. Ovary 1-celled; style 2–3-cleft or 2–3-divided, the divisions stigmatic on the inner side; ovules 2–∞, amphitropous. Capsule circumscissile, or dehiscent by 3 valves. Seeds 2–∞, reniform-globose or compressed; embryo curved. About 180 species, mostly natives of America, grouped in about 20 genera.

1. **PORTULÀCA** L.

Diffuse or ascending, glabrous or pubescent fleshy herbs, with terminal flowers. Sepals 2, united at the base and partly adnate to the ovary. Petals 4–6 (mainly 5), inserted on the calyx, fugacious. Stamens 7–∞, also on the calyx. Ovary many-ovuled; style deeply 3–9-cleft or parted. Capsule membranous, dehiscent by a lid, many-seeded. [Latin, in allusion to the purging qualities of some species.] A genus of about 20 species, all but 2 or 3 natives of America, the following typical.

1. Portulaca oleràcea L. PURSLANE. PUSSLEY. (Fig. 146.) Annual, prostrate, branching from a deep central root; branches 4′–10′ long. Leaves alternate and clustered at the ends of the branches, obovate or cuneate, 3″–10″ long, rounded at the apex, very fleshy; flower-buds flat; flowers solitary, sessile, 2″–4″ broad, yellow, opening in bright sunshine; sepals broad, keeled, acutish; style 4–6-parted; capsule 3″–5″ long; seeds finely rugose.



Common as a weed in waste and cultivated grounds and occasional in rocky situations. Native. North America and the West Indies. Probably transported to Bermuda by birds. Flowers nearly throughout the year. Used as a pot herb.

Montia fontàna L., a small aquatic cold-temperate plant, was reported by Lefroy and by H. B. Small as common in ponds and ditches, but it has not been found by other collectors; the records are probably erroneous.

Portulaca pilòsa L., SMALL PURPLE PORTULACA, a West Indian purple-flowered species with nearly cylindric linear leaves, is recorded by Reade as frequent in gardens, prior to 1883.

Family 8. **ALSINÀCEAE** Wahl.

CHICKWEED FAMILY.

Annual or perennial herbs, sometimes shrubby at the base, with a watery sap. Stems often diffusely branched. Leaves opposite, with or without stipules, entire. Flowers mostly perfect, sometimes incomplete. Calyx of 4–5 persistent, distinct or nearly distinct sepals. Corolla of 4–5 clawless petals, or wanting. Androecium of twice as many stamens as there are sepals or fewer; filaments distinct or cohering below. Anthers introrse, opening lengthwise. Ovary 1-celled or rarely 2–5-celled; styles 2–5; ovules several or many, amphitropous or campylotropous, on a central column. Fruit a capsule, opening by valves, these sometimes tooth-like. Embryo more or less curved in the endosperm, usually with incumbent cotyledons. About 32 genera and 500 species, widely distributed, most abundant in temperate regions.

Stipules none.
  Petals deeply 2-cleft or 2-parted.
    Capsule ovoid or oblong, dehiscent by valves. 1. Arenaria
    Capsule cylindric, dehiscent by teeth. 2. Cerastium
  Petals entire or merely emarginate.
    Styles as many as the sepals. 3. Sagina
    Styles fewer than the sepals. 4. Alsine
Stipules present, scarious. 5. Minuartia

1. ALSÌNE [Tourn.] L.

Tufted herbs, with cymose white flowers. Sepals 5, rarely 4. Petals of the same number, 2-cleft, 2-parted, or emarginate, white in our species, rarely none. Stamens 10 or fewer, hypogynous. Ovary 1-celled; styles commonly 3, rarely 4 or 5. Capsule dehiscent by twice as many valves as there are styles. [Greek, grove, the habitat of some species.] Species about 75, most abundant in temperate or cold climates. Type species: *Alsine media* L.

Petals shorter than the sepals. 1. *A. media.*
Petals longer than the sepals. 2. *A. Baldwinii.*



1. Alsine mèdia L. COMMON CHICKWEED. (Fig. 147.) Annual, tufted, much branched, decumbent or ascending, 4′–16′ long, glabrous except a line of hairs along the stem and branches, the pubescent sepals and the sometimes ciliate petioles. Leaves ovate or oval, 2″–1½′ long, acute or rarely obtuse, the lower often cordate; flowers 2″–4″ broad, in terminal leafy cymes or also solitary in the axils; sepals oblong, longer than the 2-parted petals; stamens 2–10; capsule ovoid, longer than the calyx; seeds rough.

Frequent or common in waste and cultivated grounds. Naturalized from Europe. Widely naturalized in temperate North America. Flowers in spring and summer.



2. Alsine Baldwínii J. K. Small. BALDWIN'S CHICKWEED. (Fig. 148.) Annual, slender, pubescent or nearly glabrous. Stem diffusely branched, the branches prostrate, 4′–2° long, forking; leaves usually numerous, ovate, sometimes as broad as long, 3″–10″ long, acute or acuminate, truncate or cordate; petioles longer than the blades except those of the upper leaves; pedicels filiform; sepals ovate, 1″–1½″ long; petals about twice as long as the sepals; capsules ovoid, surpassing the sepals; seeds minutely tuberculate, especially on the edges. [*Stellaria prostrata* Baldw., not *Alsine prostrata* Forsk.]

Sand hills, Tucker's Town, Castle Point and near Spanish Rock. Native. Southeastern United States. Its seeds probably brought to Bermuda by birds. Flowers in spring.

2. CERÁSTIUM L.

Generally pubescent or hirsute herbs, with terminal cymes of white flowers. Sepals 5, rarely 4. Petals of the same number, emarginate or bifid (rarely wanting). Stamens 10, rarely fewer. Styles equal in number to the sepals and opposite them, or in some species fewer. Capsule cylindric, 1-celled, many-ovuled, often curved, dehiscent by 10, rarely 8, apical teeth. Seeds rough, more or less flattened, attached by their edges. [Greek, horny, referring to the horn-shaped capsule of many species.] About 50 species, of wide distribution, most abundant in the temperate zones. Type species: *Cerastium arvense* L.

Pedicels not longer than the sepals; flowers glomerate. 1. *C. viscosum.*
Pedicels at length longer than the sepals; flowers loosely cymose. 2. *C. vulgatum.*

1. Cerastium viscòsum L. MOUSE-EAR CHICKWEED. (Fig. 149.) Annual, tufted, densely viscid-pubescent, 4′–12′ high. Leaves ovate, obovate, or the lower spatulate, 4″–12″ long, obtuse; bracts small, herbaceous; flowers 2″–3″ broad, in glomerate cymes; pedicels shorter than or equalling the acute sepals; petals shorter than the calyx, 2-cleft.

Common in fields and waste grounds. Naturalized from Europe. Widely naturalized in North America. Flowers in spring.





2. Cerastium vulgàtum L. LARGER MOUSE-EAR CHICKWEED. (Fig. 150.) Biennial or perennial, viscid-pubescent, tufted, 6′–18′ long. Lower and basal leaves mostly spatulate-oblong, obtuse; upper leaves oblong, 5″–12″ long; inflorescence loose, the pedicels at length longer than the calyx; sepals about equalling the 2-cleft petals, 2″–3″ long; capsule slightly curved [illegible]

Roadsides and waste grounds, occasional. Naturalized from Europe. Widely naturalized in North America. Flowers in spring and summer.

3. SAGINA L.

Tufted matted low herbs, with subulate leaves, and small pedicelled whitish flowers. Sepals 4 or 5. Petals of the same number, entire, emarginate or none. Stamens of the same number, or fewer, or twice as many. Ovary 1-celled, many-ovuled. Styles as many as the sepals and alternate with them. Capsule 4–5-valved, at length dehiscent to the base, the valves opposite the sepals. [Ancient name of the spurry.] About 10 species, natives of the northern hemisphere, the following typical.



1. Sagina procúmbens L. PROCUMBENT PEARLWORT. (Fig. 151.) Annual or perennial, branching, decumbent, or spreading, glabrous or minutely downy, matted, ¾′–3½′ high. Leaves linear, subulate, 2″–7″ long, connate at the base; flowers about 1″ broad, numerous; peduncles capillary, longer than the leaves, often recurved at the end after flowering; sepals 4, sometimes 5, ovate-oblong, generally longer than the petals, which are occasionally wanting; capsule about equalling the calyx; stamens 4, rarely 5. [*S. apetala* of Reade and of H. B. Small.]

Cliffs, Tucker's Town, and recorded by Reade as found on waysides. Naturalized from Europe or North America. Flowers in winter and spring.

4. ARENÀRIA L.

Mainly tufted herbs, with sessile leaves, and terminal cymose or capitate, rarely solitary, white flowers. Sepals 5. Petals 5, entire or scarcely emarginate, rarely none. Stamens 10. Styles generally 3 (rarely 2–5). Ovary 1-celled, many-ovuled. Capsule dehiscent at the apex by as many valves or teeth as there are styles, or twice as many. Seeds reniform-globose or compressed. [Latin, sand, in allusion to the habitat of many species.] About 150 species, of wide distribution. Type species: *Arenaria serpyllifolia* L.

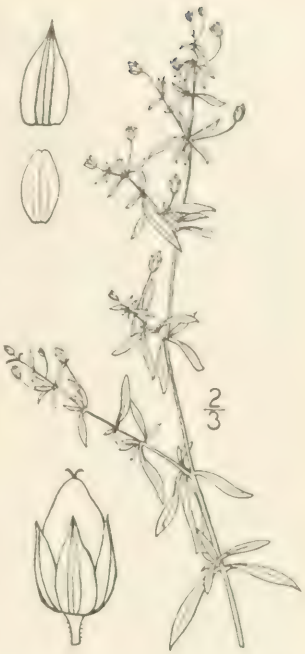
Annual; leaves ovate, 2″–4″ long. 1. *A. leptoclados.*
Perennial; leaves elliptic to narrowly spatulate, 5″–10″ long. 2. *A. lanuginosa.*

1. Arenaria leptoclàdos Guss. SLENDER THYME-LEAVED SANDWORT. (Fig. 152.) Annual, slender, slightly downy-pubescent, widely branched, 2′–8′ high. Leaves ovate, 2″–4″ long, acute; pedicels 2″–6″ long; bracts ovate, resembling the leaves; flowers 2″ broad or less, very numerous in loose panicles; sepals lanceolate, acute or mucronate, 3–5-nerved; petals obovate or oblong, usually shorter; capsule oblong, papery, dehiscent by 6 short apical valves; seeds rough.



Waste and cultivated grounds. Naturalized. Native of southern Europe. Naturalized in continental North America. Flowers nearly throughout the year. Has been referred to the similar *A. serpyllifolia* L., by previous authors.

2. Arenaria lanuginòsa (Michx.) Rohrb. DIFFUSE STARWORT. STICKWEED. (Fig. 153.) Perennial, slender. Stems branched at the base, the branches spreading, 1°–4° long, forking, more or less pubescent with hooked hairs; leaves narrowly elliptic or linear-spatulate, 5″–10″ long, acute, sessile or short-petioled; pedicels filiform; sepals lanceolate, 1½″–2″ long, acute; petals 1–5, shorter than the sepals or none; capsules ovoid, about as long as the sepals or longer. [*Arenaria diffusa* Ell.; *Spergulostrum lanuginosum* Michx.; *Stellaria nemorum* of Lefroy and of H. B. Small; *Arenaria alsinoides* of Hemsley.]



On shaded cliffs, Paynter's Vale and on bluffs and sandhills, near Tucker's Town and on Castle Point. Native. Southeastern United States, Jamaica, continental tropical America. Its seeds probably transported to Bermuda by birds.

5. TÍSSA Adans.

Low herbs, mostly with fleshy linear or setaceous leaves, often with others clustered in the axils, and small pink or whitish flowers in terminal cymes. Stipules scarious. Sepals 5. Petals the same number, rarely fewer, or none, entire. Stamens 2–10. Ovary 1-celled, many-ovuled; styles 3. Pod 3-valved to the base. Seeds reniform-globose or compressed, smooth, winged or tuberculate. [Name unexplained.] About 20 species, of wide distribution, most of them on saline shores or salt marshes. Type species: *Arenaria rubra* L.



1. Tissa marina (L.) Britton. SALT-MARSH SAND SPURRY. (Fig. 154.) Annual to perennial, erect, ascending or nearly prostrate, 4′–8′ high, branching. Stipules ovate; leaves linear, terete, fleshy, [illegible] much fascicled in the axils; pedicels 2″–5″ long; sepals about [illegible] long, capsule equalling or longer than the calyx, seeds smooth, or roughened with projecting processes, wingless, or winged. [*Arenaria rubra marina* L.]

Salt marsh, salttle Pond, [illegible] Native Coasts of North America and Europe. Flowers continuously to appear in December and continue throughout winter and spring. Presumably brought to Bermuda [illegible] the seeds perhaps carried in [illegible] recorded by previous authors.

Family 9. **CARYOPHYLLÀCEAE** Reichenb.

PINK FAMILY.

Annual or perennial herbs, with watery sap and usually erect stems swollen at the nodes. Leaves opposite, often with connate bases; stipules none. Flowers perfect, polygamous or rarely dioecious. Calyx of 4 or 5 united sepals forming a toothed tube. Corolla often showy, of 4 or 5 petals with narrow claws. Stamens usually twice as many as the petals; filaments usually distinct, inserted like the corolla and 1-celled ovary on the columnar prolongation of the receptacle. Pistil 1, compound. Styles 2–5. Ovules numerous. Fruit a capsule opening by 2–5 apical valves. Seeds many or rarely few, with the embryo straight or nearly so. About 20 genera and perhaps 600 species, most abundant in the northern hemisphere.

1. **SILÈNE** L.

Herbs, with mainly pink, red or white flowers. Calyx more or less inflated, 5-toothed or 5-cleft, 10–many-nerved, not bracted at the base. Petals 5, narrow, clawed. Stamens 10. Styles 3 (rarely 4 or 5); ovary 1-celled, or incompletely 2–4-celled. Pod dehiscent by 6 or rarely 3 apical teeth. Seeds mainly spiny or tubercled. [Greek, saliva, in allusion to the viscid secretions of many species.] About 250 species, of wide geographic distribution. Type species: *Silene anglica* L.

Petals longer than the calyx; plants hirsute or villous-pubescent.
  Flowers in spike-like racemes, diurnal, small. 1. *S. anglica.*
  Flowers panicled, nocturnal, large. 2. *S. noctiflora.*
Petals minute; plant glandular-puberulent. 3. *S. nocturna.*

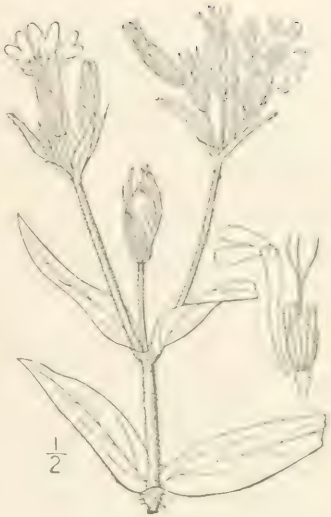


1. Silene ánglica L. ENGLISH OR SMALL-FLOWERED CATCHFLY. (Fig. 155.) Annual, hirsute-pubescent; stem 1°–2° high. Leaves spatulate or oblanceolate, ½′–2′ long, obtuse, sometimes mucronate, or the upper narrower and acute; flowers in a terminal simple 1-sided raceme, nearly sessile or the lower ones distant and longer-pedicelled, sometimes all distinctly pedicelled; calyx 10-nerved, villous, 4″–5″ long, much enlarged by the ripening pod, its teeth lanceolate, spreading; petals white, somewhat longer than the calyx. [*S. gallica* L.]

Rare or occasional in waste and cultivated grounds. Introduced. Native of Europe. Flowers in spring. Adventive or naturalized in the United States.

2. Silene noctiflòra L. NIGHT-FLOWERING CATCHFLY. (Fig. 156.) Annual, viscid-pubescent, 1°–3° high. Lower and basal leaves obovate or oblanceolate, 2′–5½′ long, obtuse, narrowed into a broad petiole; upper leaves sessile, ovate-lanceolate, acute or acuminate; flowers few, white or pinkish, ¾′–1′ broad, in a loose panicle; calyx about 1′ long, tubular, 10-nerved and beautifully veined, much enlarged by the ripening pod, its teeth linear, acute; petals 2-cleft.

Waste grounds, west end of Causeway and north end of Harrington Sound, 1909. Introduced. Native of Europe. Flowers in spring. Naturalized in North America. The fragrant flowers open at dusk and remain so until the morning of the next day.





3. Silene noctùrna L. NOCTURNAL CATCHFLY. (Fig. 157.) Annual, glandular-puberulent, somewhat viscid above, 1°–2° high, erect or ascending. Leaves oblanceolate to oblong-spatulate, or the upper linear, 1′ long or less, often ciliate toward the base; flowers distant in narrow racemes, the lower slender-pedicelled; calyx narrowly tubular, about 4″ long, 10-nerved, its teeth lanceolate, ciliate; petals very small, scarcely exceeding the calyx; capsule subcylindric.

Top of cliffs, abundant, South Shore near Tucker's Town, 1908 and 1909, and on Ward's Hill, 1912. Introduced. Native of southern Europe. Flowers in spring. The flowers are inconspicuous, opening at night.

Silene maritima With., MARITIME BLADDER CAMPION, European, [illegible] to the Montrose garden in 1911, is a glabrous slender, branched perennial plant, 1° high, with narrowly oblong or oblanceolate leaves 1′–3′ long, and few whitish flowers with an inflated calyx 8″–10″ long.

Dianthus Caryophýllus L., CARNATION, CLOVE PINK, of southern Europe, grown in flower-gardens, has tufted, linear leaves, the stem 2° high or more, a cylindric, many-nerved calyx about 1′ long, and spreading, toothed or incised, red to white petals, the flowers solitary or few together, long-stalked, often double.

Dianthus barbàtus L., SWEET WILLIAM, European and Asiatic, perennial, 1′–2° high, with lanceolate leaves, and pink or white, small flowers in large terminal cymes, the calyx long-toothed, is mentioned by Reade as grown in flower-gardens.

Saponaria calàbrica Guss., CALABRIAN SOAPWORT, of southern Europe, mentioned by Jones, is annual, low, 4′–8′ high, with oblong leaves and small, pink flowers.

Gypsophila élegans Bieb., TALL GYPSOPHILA, native of the Caucasus, occasional in flower-gardens, is a glabrous, much-branched annual 1°–2° high, with a few pairs of oblong to linear leaves, or the lower ones spatulate, and large panicles of small, white or lilac flowers with 5 clawed petals and 2 styles, the subglobose pods 4-valved.

Lychnis Coeli-rosa (L.) Desv., ROSE OF HEAVEN, of the Mediterranean region, grown in flower-gardens, is annual, glabrous, 1°–2° high, with narrowly linear, long-acuminate leaves 1½′–3′ long, rose-red flowers about 1′ broad, the many-ribbed calyx club-shaped. [*Agrostemma Coeli-rosa* L.]

Order 14. RANÀLES.

Herbs, shrubs or trees. Calyx present, usually of separate sepals. Corolla usually present and of separate petals. Ovary or ovaries superior, free from the calyx; carpels 1 to many, usually separate. Stamens mostly hypogynous and more numerous than the sepals.

* *Aquatic herbs; floating leaves peltate, or with a basal sinus.*

Carpels 3 or more; petals large; floating leaves not dissected.
Pistil 1; petals none; leaves whorled, all submersed and dissected. — Fam. 1. NYMPHAEACEAE.
Fam. 2. CERATOPHYLLACEAE.

** *Land or marsh plants (some Ranunculaceae aquatic).*

Stamens numerous; sepals distinct; petals present (except in some Ranunculaceae).
Fruit aggregate, cone-like; trees; sepals and petals in 3 series, or more, of 3. — Fam. 3. MAGNOLIACEAE.
Fruit not aggregate; the carpels separate, at least when mature.
Anthers not opening by valves; pistils usually more than 1.
Sepals 3; petals 6; shrubs or trees. — Fam. 4. ANNONACEAE.
Sepals 3–15; petals (when present) about as many; our species herbs or vines. — Fam. 5. RANUNCULACEAE.
Anthers opening by valves; pistil 1. — Fam. 6. BERBERIDACEAE.
Stamens 9 or 12, in 3 or 4 series of 3; anthers opening by valves; aromatic trees or shrubs with no petals, more or less united sepals, and 1 pistil. — Fam. 7. LAURACEAE.

Family 1. NYMPHAEÀCEAE DC.

WATER LILY FAMILY.

Aquatic perennial herbs, with horizontal rootstocks, floating, immersed or rarely emersed leaves, and solitary axillary flowers. Sepals 3–5. Petals 5–∞. Stamens 5–∞; anthers erect, the connective continuous with the filament. Carpels 3–∞, distinct, united, or immersed in the receptacle. Stigmas distinct, or united into a radiate or annular disk; ovules 1–∞, orthotropous. Fruit indehiscent. Seeds enclosed in pulpy arils, or rarely naked; cotyledons fleshy; hypocotyl very short. Five genera and about 45 species, of wide distribution in fresh-water lakes and streams, none native nor naturalized in Bermuda.

Castalia zanzibarènsis (Casp.) Britton, ZANZIBAR WATER LILY, of Zanzibar, with ovate-orbicular, long-petioled leaves with a deep basal sinus, their margins somewhat sinuate, the long-peduncled flowers bright blue, with about 20 oblong petals 1′–1½′ long, was seen blooming in a tank at Orange Valley in 1914, where it had been grown for several years. [*Nymphaea zanzibarensis* Casp.]

Lefroy records failure in establishing *Nymphaea coerulea* Sav., and *N. dentata* Sch. & Thoum.

Nelumbo Nelúmbo (L.) Karst., INDIAN LOTUS OR SACRED BEAN, Asiatic, with long-petioled erect, orbicular, concave, centrally peltate leaves 1° or more in diameter, and pink flowers 6′–12′ broad, the oblong or elliptic petals obtuse, is occasionally grown in tanks. It represents the related family NELUMBONACEAE. [*Nymphaea Nelumbo* L.; *Nelumbo nucifera* Gaertn.]

Family 2. CERATOPHYLLÀCEAE A. Gray.

HORNWORT FAMILY.

Submerged aquatics, with slender stems, and verticillate pectinate rigid leaves, the monoecious or dioecious flowers solitary and sessile in the axils. Perianth many-parted, the segments entire or toothed. Stamens numerous, crowded on a flat or convex receptacle; anthers sessile or nearly so, linear-oblong, extrorse, the connective prolonged into a thick appendage beyond the sacs. Pistillate flowers with a superior 1-celled ovary; ovule 1, orthotropous, pendulous; style filiform, stigmatic at the summit. Fruit an indehiscent nut or achene. Endosperm none; embryo composed of 4 verticillate cotyledons, with a short hypocotyl and a plumule of several nodes and leaves. The family contains only the following genus:

1. CERATOPHÝLLUM L.

Only the following species, which is abundant in ponds and ditches throughout temperate North America and in Cuba. [Greek, horny leaf.]

1. Ceratophyllum demérsum L. HORNWORT. DITCHWEED. (Fig. 158.) Stems 1½°–7° long. Leaves 4″–12″ long; ripe fruit oval, 2″–3″ long with a spine-like beak 2″–4″ long, smooth and spurless or with a long basal spur on each side, or tuberculate and with narrowly winged spiny margins or broadly winged without spines.



Bermuda, according to Rein, and also listed by Hemsley; common in Pembroke Marsh, according to Lefroy. Not found by recent collectors, but admitted here because it could not well have been mistaken. Presumably native. The description of this species by H. B. Small applies to the Water Hyacinth, *Piaropus crassipes*, a curious error.

Family 3. **MAGNOLIÀCEAE** J. St. Hil.

MAGNOLIA FAMILY.

Trees or shrubs, with alternate leaves, large solitary flowers, and bitter aromatic bark. Sepals and petals hypogynous, deciduous. Stamens ∞; anthers adnate. Carpels ∞, separate or coherent, borne on the surface of the elongated receptacle, ripening into an aggregate fruit composed of 1–2-seeded follicles or achenes. About 10 genera and 75 species, of wide distribution, none native in Bermuda.

Magnolia grandiflòra L., BULL BAY, North American, a large evergreen tree, with broad leaves 4′–12′ long, dark green above, brown-tomentose beneath, the creamy-white lemon-scented flowers 4′–8′ broad, is occasionally seen on lawns and about houses, growing well. Lefroy records that two other *Magnolias* were grown at Mount Langton in 1875, but died out.

Liriodendron Tulipífera L. TULIP-TREE, North American, was grown at Par-la-Ville, Hamilton, prior to 1879, flowering in June, according to Lefroy, and mentioned by Verrill; its broad truncate or notched leaves are peculiar and characteristic, its greenish yellow flowers about 2′ high. Mahoe (*Pariti tiliaceum*) is now called Tulip-tree in Bermuda. A recent attempt to grow *Liriodendron* near Bailey's Bay met with failure.

Michelia fuscàta (Andr.) Blume, VELVETY MICHELIA, Chinese, a shrub, up to about 15° high, with densely brown-tomentose twigs, its elliptic, entire leaves pointed at both ends, 2′–4′ long, short-petioled, was seen at Cedar Lodge in 1914. The fragrant flowers of this shrub are about 1′ broad, the yellowish petals tinged with red, the carpels loosely spicate. [*Magnolia fuscata* Andr.]

Family 4. **ANNONÀCEAE** DC.

CUSTARD-APPLE FAMILY.

Trees or shrubs, generally aromatic, with alternate entire leaves. Stipules none. Sepals 3 (rarely 2), valvate or rarely imbricate. Petals about 6, arranged in 2 series. Stamens ∞; anthers adnate, extrorse. Carpels ∞, separate or coherent, mainly fleshy in fruit. Seeds large, anatropous; embryo minute; endosperm copious, wrinkled. About 46 genera and 550 species, mostly in the tropics, a few in the temperate zones. None are native in Bermuda.

1. **ANNÒNA** L.

Shrubs or trees. Leaves persistent, entire, leathery. Flowers perfect, white or yellow, solitary, clustered or rarely racemose. Sepals 3, valvate, concave, somewhat united, deciduous. Petals mostly 6, valvate, fleshy, concave, converging, 3-angled at the apex, the outer ones larger, the inner sometimes wanting. Receptacle hemispheric. Anther-sacs contiguous, united to the back of the filament, surmounted by the truncate, sometimes glandular tip of the connective. Carpels numerous, on the top of the receptacle. Ovaries prolonged into a nearly sessile stigma. Ovule solitary, erect. Fruit compound, many-celled. Seeds flattened, with a brown leathery-crustaceous testa, enclosed in an aril. [Name said to be derived from the Malayan.]

Annona muricàta L., SOUR-SOP, West Indian, has oblong smooth leaves, the flower with 6 nearly equal greenish-yellow petals; the ovoid fruit is 6′ to

10′ long, greenish, with many fleshy recurved processes, the pulp white and acid, much used for cooling drinks. It is commonly planted.

Annona squamòsa L., SUGAR APPLE, Tropical American, has narrowly oblong leaves pubescent beneath, at least when young, or nearly glabrous; the fragrant flowers have 3 linear petals, greenish with a purple base within; the fruit is subglobose, more or less irregular, bluntly tubercled or nearly smooth, 2½′–4′ in diameter, the pulp whitish and sweet and delicious. It is commonly planted and appears in places as if spontaneous.

Annona Cherimòlia Mill., CHERIMOYA, of tropical America, occasionally planted, is a small tree, up to about 15° high, with elliptic, short-pointed leaves 4′–8′ long, glabrous or nearly so above, pubescent beneath; the flowers have 3 oblong, velvety petals, and the ovoid fruit is slightly tubercled.

Annona reticulàta L., CUSTARD APPLE, West Indian, a tree up to 30° high, with oblong-lanceolate leaves 5′–8′ long, becoming nearly smooth, the flowers with 3 linear-oblong, keeled petals, the globose fruit areolated, greenish-yellow, about 4′ in diameter, has occasionally been planted.

Artabotrys odoratíssima (Roxb.) R. Br., YLANG-YLANG, East Indian, a straggling or climbing shrub, with rather thin, short-petioled, oblong or oblong-lanceolate, acuminate leaves 5′–10′ long, the brownish fragrant flowers about 8″ wide, few together on curiously bent and hooked peduncles, with 3 sepals and 6 petals, is occasionally grown for ornament and interest. [*Uvaria odoratissima* Roxb.]

Rollinia Sièberi A. DC., SIEBER'S ROLLINIA, of Trinidad and continental tropical America, recorded by Jones in 1873 as grown in Bermuda, is a tree with oblong, entire, pinnately veined leaves 4′–6′ long, the 1-seeded carpels united into a syncarp.

Family 5. **RANUNCULÀCEAE** Juss.

CROWFOOT FAMILY.

Herbs, or rarely climbing shrubs, with acrid sap. Leaves alternate (except in *Clematis* and *Atragene*). Stipules usually none, but the base of the petiole often sheathing. Pubescence, when present, composed of simple hairs. Sepals 3–15, generally caducous, often petal-like, imbricate, except in *Clematis* and *Atragene*. Petals about the same number (occasionally more), or wanting. Stamens ∞, hypogynous, their anthers introrse. Carpels ∞ or rarely solitary, 1-celled, 1-many ovuled. Ovule anatropous. Fruit achenes, follicles or berries. Seeds with endosperm. About 35 genera and 1100 species, distributed throughout the world, not abundant in the tropics.

1. **RANÚNCULUS** [Tourn.] L.

Herbs, with alternate simple entire lobed or divided or dissected leaves, and yellow white or red flowers. Sepals mostly 5, deciduous. Petals equal in number or more, conspicuous or minute, provided with a nectariferous pit and a scale at the base of the blade. Carpels ∞, 1-ovuled. Achenes sessile, spicate, generally flattened, tipped with a minute or an elongated style. [Latin for a small frog, in allusion to the marsh habitat of many species.] Some 275 species, widely distributed in the temperate and cool regions of both hemispheres and on mountain tops in the tropics. Type species: *Ranunculus sceleratus comus* L.

Flowers large; achenes smooth.
  Stems erect. 1. *R. acris.*
  Stems creeping or ascending. 2. *R. repens.*
Flowers small; achenes papillose or muricate.
  Achenes rough-papillose. 3. *R. parviflorus.*
  Achenes muricate. 4. *R. muricatus.*

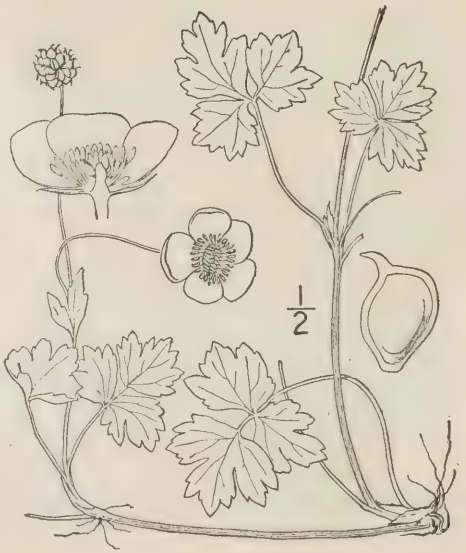


1. Ranunculus àcris L. TALL OR MEADOW BUTTERCUP. (Fig. 159.) Hairy, branched above, 2°–3° high. Basal leaves tufted, petioled, 3–7-divided, the divisions sessile and cleft into numerous narrow mainly acute lobes; upper leaves short-petioled and merely 3-parted; flowers about 10″ broad; petals twice or thrice the length of the calyx, obovate; head of fruit globose, 6″–7″ broad; achenes compressed, short-beaked.

Grassy woods, South Shore road, Devonshire, 1905. Introduced. Native of Europe. Flowers from spring to autumn. Widely naturalized in North America, where it is a weed in fields and meadows.

2. Ranunculus rèpens L. CREEPING BUTTERCUP. (Fig. 160.) Generally hairy, sometimes only slightly so; stems creeping or ascending. Leaves petioled, 3-divided, the terminal division, or all three stalked, all ovate, cuneate or truncate, acute, cleft and lobed, often blotched; flowers nearly 1′ broad; petals obovate, much exceeding the spreading sepals; head of fruit globose, 4″ in diameter; achenes margined, tipped with a stout short slightly bent beak.

Border of Pembroke Marsh, 1905, and reported also by Reade. Introduced. Native of Europe. Naturalized in eastern North America. Flowers from spring to autumn.



3. Ranunculus parviflòrus L. SMALL-FLOWERED CROWFOOT. (Fig. 161.) Hairy, slender, diffuse, branching from the base, 6′–10′ high. Basal leaves long-petioled, the blade reniform or cordate-orbicular, 1′ broad or less, 3-cleft, the lobes broadly oval, obtuse, cut and toothed; upper leaves short-petioled or nearly sessile, 3–5-parted into linear-oblong lobes; flowers yellow, 1″–2″ wide, petals little longer than the calyx; head of fruit globose, 2″ broad; achenes flat, margined, densely papillose, tipped with a sharp beak of about one fourth their length or less.

Common in waste and cultivated grounds. Naturalized from Europe. Naturalized in the southeastern United States. Flowers in spring and summer.





4. Ranunculus muricàtus L. SPINY-FRUITED CROWFOOT. (Fig. 162.) Glabrous or sparingly pubescent, branched from the base, 1°–2° high. Lower and basal leaves on long broad petioles, the blade reniform or cordate-orbicular, 1′–2′ wide, 3-lobed, cleft, or crenate; the upper 3-divided, cuneate, short-petioled or sessile; flowers light yellow, 3″–5″ wide, the petals exceeding the calyx; head of fruit globular, 5″–6″ wide; achenes flat, 2″ long, tipped with a stout slightly curved beak.

Common in waste and cultivated grounds. Naturalized from Europe. Naturalized in the southeastern United States. Flowers in spring and summer.

Clematis Flámmula L., SWEET CLEMATIS, European, a vine with many panicled small white flowers, opposite ternately compound leaves, the 4 sepals linear-oblong, the petals wanting, the numerous stamens spreading, the fruit a head of flat achenes with long plumose tails, is commonly planted for ornament on walls and porches.

Clematis Jáckmani Jackman, of hybrid origin between two Asiatic species, recorded by Lefroy as introduced in 1874, has very large white or purple flowers up to about 5′ broad, its leaves 3 foliolate or simple, ovate, cordate and acuminate. [*C. japonica Jackmani* of Lefroy.] Presumably the plant mentioned by Jones as *C. japonica.*

Delphinium Ajàcis L., Garden Larkspur, European, commonly grown in flower-gardens in many forms, is annual, puberulent, 1½°–3° high, with leaves dissected into linear segments, the irregular showy, white, violet or blue flowers with one sepal and two petals spurred, the single pubescent follicle 1′ long or less.

Delphinium Consólida L., Field Larkspur, also European, mentioned by Lefroy as grown in Bermuda gardens, is much like *D. Ajacis*, but the follicle is glabrous.

Aquilegia vulgàris L., European Columbine, European, a glabrous perennial about 1½° high, with ternately decompound leaves, pale beneath, their segments obtuse and crenate, the irregular purple or white flowers nearly 1′ long, the petals prolonged backward into incurved spurs, was grown in the garden at Spring Valley in 1914.

Nigella damascèna L., Love-in-a-Mist, European, grown in flower-gardens, is a glabrous annual, 1°–2° high, with branched stems, finely dissected leaves 1′–2′ long, and blue or white flowers about 1½′ broad, the 5 ovate sepals deciduous, the 5 notched petals with hollow claws, the fruit a subglobose capsule nearly 1′ thick, with 5 spreading, persistent, styles, the numerous small seeds black.

Anemone japónica Sieb. & Zucc., Japanese Anemone, of Eastern Asia, occasional in flower-gardens, is a softly pubescent perennial about 3° high, with ternate, long-petioled, basal leaves, the few red or purple flowers about 2′ broad, on long erect peduncles from a 3-leaved involucre, the 6–9 sepals petaloid, the petals none.

Family 6. **BERBERIDÀCEAE** T. & G.

Barberry Family.

Shrubs or herbs, with alternate or basal leaves, with or without stipules, and solitary or racemed mostly terminal flowers. Sepals and petals generally imbricated in several series. Stamens as many as the petals and opposite them, hypogynous. Flowers perfect and pistil one in our species. Anthers extrorse, opening by valves (except in *Podophyllum*). Style short; ovules 2–∞, anatropous. Fruit a berry or capsule. About 20 genera and 105 species, widely distributed in the north temperate zone, the Andes and temperate South America, a few in tropical regions.

Berberis vulgàris L., European Barberry, of which the purple-leaved race has been planted for ornament at the Public Garden, St. Georges, is a glabrous, more or less spinescent shrub usually less than 10° high, with obovate, short-petioled, obtuse, spinulose-dentate leaves 2′ long or less, and small, yellow flowers in drooping racemes, the sepals, petals and stamens 6, the fruit oblong red or purple acrid berries about 5″ long.

Berberis Thùnbergi DC., Thunberg's Barberry, Asiatic, seen at Cedar Lodge in 1914, is a densely branching glabrous, spiny shrub, becoming, under favorable conditions, about 6° high, with spatulate, entire leaves about 1′ long, the yellowish flowers solitary or 2 or 3 together in the axils, the ellipsoid fruit bright red.

Family 7. **LAURÀCEAE** Lindl.

Laurel Family.

Aromatic trees and shrubs, with alternate (very rarely opposite) mostly thick, punctate estipulate leaves. Flowers mostly small, perfect, polygamous, dioecious, or sometimes monoecious, usually fragrant, yellow or

greenish, in panicles, corymbs, racemes or umbels. Calyx 4–6-parted, the segments imbricated in 2 series in the bud. Corolla none. Stamens inserted in 3 or 4 series of 3 on the calyx, distinct, some of them commonly imperfect or reduced to staminodia; anthers opening by valves. Ovary superior, free from the calyx, 1-celled; ovule solitary, anatropous, pendulous; stigma discoid or capitate. Fruit a 1-seeded drupe or berry. Endosperm none. Cotyledons plano-convex, accumbent. About 40 genera and probably 1000 species, widely distributed in tropical regions; a few in the temperate zones. There are no species native to Bermuda.

Persea Persea (L.) Cockerell [*Persea gratissima* Gaertn.], ALLIGATOR PEAR, AVOCADO PEAR, Mexican, is a large tree commonly planted for its valuable fruit, which is a large oblong or pear-shaped drupe, sometimes 6′ long, with buttery flesh, largely used in salads, and a hard pit. The small greenish flowers are borne in cymes; the oval or elliptic, petioled, pinnately veined leaves are 3′–6′ long. Trees differ greatly in the amount of fruit produced.

Laûrus nóbilis L., SWEET BAY, European, is planted for ornament, and locally established in hedges and roadside thickets, but does not appear to exist except where it has been planted. It is an evergreen, glabrous, densely leafy shrub or small tree, becoming 20° high, with oblong or lanceolate, coriaceous leaves 3′–4′ long, narrowed at both ends, fragrant when crushed; the small greenish flowers are borne in umbels, the staminate and perfect ones with 12 stamens in 3 series, the pistillate with 4 staminodes and a short style; the ovoid berry is about 5″ long.

Camphòra Camphòra (L.) Karst., CAMPHOR, of eastern Asia, a tree up to 25° high, the bark and leaves the source of gum camphor, has been planted for interest and grows luxuriantly; the buds are covered by scales; its ovate to elliptic, 3-nerved, slender-petioled, acuminate leaves are 2′–4′ long, whitish beneath when young; the small whitish flowers are in axillary panicles; there are 9 stamens; the fruit is a globose or oval drupe about 4″ in diameter. A tree at Norwood, 20 years old, was about 23° high in 1914, with a trunk circumference of 27½′. This tree has become naturalized in southern Florida. [*Laurus Camphora* L.; *Cinnamomum Camphora* Nees & Eberm.]

Cinnamomum Càssia Blume, CASSIA-BARK, Chinese, has been planted for interest. It is a tree with coriaceous, evergreen, oblong leaves 4′–8′ long, narrowed at both ends, shining and finely reticulate-veined above, its buds not scaly; the small flowers, with 9 stamens, are in axillary panicles; the fruit is an oblong drupe 6″–8″ long.

Jones, in 1873, mentions an undetermined tree of this family as *Oreodaphne*.

Order 15. PAPAVERÀLES.

Mostly herbs, with clustered, regular and perfect flowers. Petals, with very rare exceptions, present, separate. Sepals usually separate. Stamens hypogynous. Ovary superior, free from the calyx, compound, composed of two united carpels, or more.

Sepals 2 (very rarely 3 or 4); endosperm fleshy.
  Flowers regular. Fam. 1. PAPAVERACEAE
  Flowers irregular. Fam. 2. FUMARIACEAE
Sepals or calyx-segments 4–8; endosperm none.
  Capsule 2-celled by a longitudinal partition, usually 2-valved, rarely indehiscent; sepals and petals 4. Fam. 3. BRASSICACEAE
  Capsule 1-celled, of 2–6 carpels.
    Style short or wanting; seeds wingless.
      Sepals and petals 4, regular, or petals irregular; capsule of 2 carpels, 2-valved. Fam. 4. CAPPARIDACEAE
      Sepals and petals 4–8, irregular; capsule of 3–6 carpels, 3–6-valved at the top; disk large. Fam. 5. RESEDACEAE
    Style elongated; seeds winged. Fam. 6. MORINGACEAE

Family 1. **PAPAVERACEAE** B. Juss.

POPPY FAMILY.

Herbs, with milky or colored sap, and alternate leaves or the upper rarely opposite. Stipules none. Flowers perfect, regular. Sepals 2 (rarely 3 or 4), caducous. Petals 4–6 or rarely more, imbricated, often wrinkled, deciduous. Stamens hypogynous, distinct; filaments filiform; anthers longitudinally dehiscent. Ovary 1, many-ovuled, mainly 1-celled; style short; ovules anatropous. Fruit a capsule, generally dehiscent by a pore, or by valves. About 23 genera and 115 species, widely distributed, most abundant in the north temperate zone.

Leaves not spiny-toothed. 1. *Papaver.*
Leaves spiny-toothed. 2. *Argemone.*

1. **PAPÀVER** [Tourn.] L.

Sap milky. Leaves lobed or dissected, alternate. Flowers and flower-buds nodding. Sepals 2 or occasionally 3. Petals 4–6. Stamens ∞. Anthers extrorse. Ovules ∞, borne on numerous internally-projecting placentae. Stigmas united into a radiate persistent disk. Capsule globose, obovoid, or oblong, dehiscent near the summit. Seeds marked with minute depressions. [Classic Latin name of the poppy.] About 45 species, mostly natives of the Old World, but 4 or 5 indigenous in western America. Type species: *Papaver somniferum* L.

Glabrate and glaucous; leaves lobed, clasping; capsule subglobose. 1. *P. somniferum.*
Green, hirsute; leaves pinnately divided.
  Capsule subglobose or top-shaped. 2. *P. Rhoeas*
  Capsule oblong, narrowed below. 3. *P. dubium.*



1. Papaver somniferum L. OPIUM OR GARDEN POPPY. (Fig. 163.) Erect, glaucous, 1°–3° high. Leaves clasping by a cordate base, 4′–8′ long, oblong, wavy, lobed or toothed; flowers 2½′–4′ broad, bluish-white with a purple centre; filaments somewhat dilated upward; capsule glabrous.

Waste grounds, escaped from cultivation. Occasional in gardens. Introduced. Native of Europe. Occasional in waste grounds in the eastern United States. Flowers from spring to autumn.

The Bermuda Opium Act of 1914 has the following paragraph relative to this plant:

"2. It shall not be lawful to grow or cultivate in these Islands the opium poppy (papaver somniferum) for the purpose of manufacturing opium therefrom, nor to manufacture in these Islands any opium from opium poppies grown in these Islands."

2. **Papaver Rhoèas** L. Field, Red or Corn Poppy. (Fig. 164.) Erect, 1°–3° high, hispid with spreading bristly hairs. Lower leaves petioled, 4′–6′ long, the upper smaller, sessile, all pinnatifid; lobes lanceolate, acute, serrate; flowers 2′–4′ broad, scarlet with a darker centre; filaments not dilated; capsule turbinate to subglobose, glabrous, the disk with 10 or more stigmatic rays.

Waste and cultivated grounds. Naturalized from Europe. Naturalized in the eastern United States. Flowers in spring and summer. Shirley Poppies, garden derivatives of this species, are grown in flower-gardens.





3. **Papaver dùbium** L. Long Smooth-fruited Poppy. (Fig. 165.) Slender, 1°–2° high, hirsute with spreading hairs. Lower leaves petioled, 4′–6′ long, the upper smaller, nearly sessile, all deeply pinnately divided; lobes oblong, pinnatifid, cleft or sometimes entire; flowers about 2′ broad, scarlet, sometimes darker in the centre; filaments not dilated; capsule oblong or narrowly oblong-obovoid, glabrous, 8″–10″ long, narrowed below; stigmatic rays 6–10.

Common in waste and cultivated grounds. Naturalized from Europe. Naturalized or adventive in the eastern United States. Flowers in spring.

2. ARGEMÒNE L.

Glaucous herbs, with yellow sap, spiny-toothed leaves and large flowers. Sepals 2 or 3. Petals 4–6. Stamens ∞. Placentae 4–6, many-ovuled. Style very short. Stigma dilated, 3–6 radiate. Capsule prickly, oblong, dehiscent at the apex by valves. Seeds numerous, cancellate. [Greek, an eye disease, supposed to be relieved by the plant so called.] A genus of about 10 species, natives of the warmer parts of America, the following typical.



1. Argemone mexicàna L. Mexican or Prickly Poppy. Stinging Thistle. Queen Thistle. (Fig. 166.) Stem 1°–2½° high, spiny or sometimes nearly unarmed. Leaves sessile, clasping by a narrowed base, 4′–10′ long, glaucous, runcinate-pinnatifid, spiny-toothed and more or less spiny on the veins; flowers orange or yellow, sessile or subsessile, 1′–3′ broad; sepals acuminate, bristly-pointed; capsule 1′ long or more; stigma sessile.

Common in waste and cultivated grounds. Naturalized from tropical America. Naturalized in the southeastern United States and West Indies. Flowers nearly throughout the year.

Eschscholtzia califórnica Cham., Eschscholtzia, California Poppy, of the western United States, grown in flower-gardens, is a glabrous and glaucous branching perennial, usually cultivated as an annual, with alternate, finely dissected leaves 2′–4′ long, their ultimate segments nearly linear, and peduncled, bright yellow or orange flowers 2′–3′ broad, with 4 broad petals, a hooded calyx of 2 sepals, and numerous stamens, the fruit a linear ribbed capsule about 3′ long.

Hunnemannia fumariaefòlia Sweet, Giant Yellow Tulip Poppy, Mexican, grown at Cedar Lodge in 1914, resembles the California Poppy, but has larger ternately dissected leaves with broader segments; its bright yellow flowers have 2 separate sepals, 4 broad petals and numerous stamens; the fruit is a linear, ribbed capsule.

Family 2. **FUMARIÀCEAE** DC.

Fumitory Family.

Annual, biennial or perennial herbs with a watery sap. Leaves alternate, often all basal, compound, usually dissected, very delicate. Flowers perfect, irregular, in racemes, panicles or cymes. Calyx of 2 scale-like sepals. Corolla of 4 petals, the outer (lateral) spreading above, one or both saccate or spurred at the base, the inner smaller, thickened at the tips. Stamens 6; filaments diadelphous; anthers, various, middle one 2-celled, lateral 1-celled. Gynoecium of 2 carpels united into a single pistil. Ovary 1-celled, with 2 parietal placentae; stigma flattened contrary to the placentae, 2-lobed or 2-horned. Ovules numerous or rarely solitary. Fruit a silique-like capsule or, in the following genus, indehiscent. Seeds with a minute embryo in fleshy endosperm. Five genera and about 150 species, mostly in temperate regions.

1. **FUMÀRIA** [Tourn.] L.

Herbs, with finely dissected leaves, and small racemose flowers. Sepals 2, scale-like. Petals 4, erect-connivent, the outer pair larger, 1 of them spurred, the inner narrow, coherent at the apex, keeled or crested on the back. Stamens 6, diadelphous, opposite the outer petals. Ovule 1; style slender; stigma entire or lobed. Fruit 1-seeded, nearly globose, indehiscent. [Name from the Latin, smoke, from the smoke-like smell of some species.] About 40 species, all natives of the Old World. Type species: *Fumaria officinalis* L.

1. Fumaria muràlis Souder. WALL FUMITORY. (Fig. 167.) Glabrous; stems diffuse or ascending, 6′–2° long. Leaves petioled, finely dissected into entire or lobed linear oblong or cuneate segments; racemes narrow; pedicels 1″–2″ long, axillary to small bracts; flowers purplish, about 3″ long, darker at the summit; spur rounded; nut about 1″ in diameter, rounded. [*F. densiflora* of Reade and of Millspaugh; *F. agraria* of Reade and of H. B. Small; *F. officinalis* of Lane, Jones, Rein and Hemsley.]

Common in waste and cultivated grounds. Naturalized from Europe. Flowers nearly throughout the year.



Notwithstanding published records, there appears to be no evidence, by specimens preserved, of more than one species of *Fumaria* in Bermuda. *F. officinalis* L., European, naturalized in the United States, has a depressed-globose, retuse nut.

Family 3. **BRASSICÀCEAE** Lindl.

MUSTARD FAMILY.

Herbs, rarely somewhat woody, with watery acrid sap, alternate leaves, and racemose or corymbose flowers. Sepals 4, deciduous, or rarely persistent, the 2 outer narrow, the inner similar, or concave, or saccate at the base. Petals 4, hypogynous, cruciate, nearly equal, generally clawed. Stamens 6, hypogynous, tetradynamous, rarely fewer. Pistil 1, compound, consisting of 2 united carpels, the parietal placentae united by a dissepiment; style generally persistent, sometimes none; stigma discoid or usually more or less 2-lobed. Fruit a silique or silicle, generally 2-celled, rarely 1-celled, in a few genera indehiscent. Seeds attached to both sides of the

septum; endosperm none; cotyledons incumbent, accumbent or conduplicate. About 200 genera and 1800 species, of wide geographic distribution.

Fruit a silicle, little, if any, longer than wide, orbicular, globose or oblong.
- Silicle flattened at right angles to the septum.
  - Seed solitary in each cell of the silicle.
    - Silicles smooth, orbicular to ovate. — 1. *Lepidium.*
    - Silicles rugose or tubercled, didymous. — 2. *Carara.*
  - Seeds several in each cell of the winged silicle. — 3. *Thlaspi.*
- Silicle flattened parallel to the septum. — 4. *Koniga.*

Fruit an elongated silique.
- Silique dehiscent into two valves.
  - Plants densely stellate-pubescent. — 5. *Microstigma.*
  - Plants not stellate-pubescent.
    - Silique not beaked. — 6. *Erysimum.*
    - Silique distinctly beaked.
      - Silique terete; seeds in a single row.
        - Silique conic-beaked, its valves 1-nerved. — 7. *Brassica.*
        - Silique stout-beaked, its valves 3–5-nerved. — 8. *Sinapis.*
      - Silique flattened; seeds in 2 rows. — 9. *Diplotaxis.*
- Silique indehiscent.
  - Silique of 2 joints, separating when ripe. — 10. *Cakile.*
  - Silique constricted between the seeds, not jointed. — 11. *Raphanus.*

Fruit a triangular obcordate silicle. — 12. *Bursa.*

1. **LEPÍDIUM** [Tourn.] L.

Erect or rarely diffuse herbs, with pinnatifid lobed or entire leaves and racemose white or whitish flowers. Stamens often fewer than 6. Petals short, sometimes none. Silicles oblong or obovate, flattened contrary to the partition, winged or wingless; valves keeled, dehiscent. Seeds solitary in each cell, flattened; cotyledons incumbent or rarely accumbent. [Greek, a little scale, from the flat scale-like pods.] About 65 species, widely distributed. Type species: *Lepidium latifolium* L.



1. Lepidium virgínicum L. WILD PEPPER-GRASS. (Fig. 168.) Annual; stem erect, 2° high or less, glabrous. Basal leaves obovate or spatulate in outline, generally with a large terminal lobe and numerous small lateral ones, all dentate, glabrous or slightly pubescent; stem-leaves lanceolate or oblong-linear, sessile, or the lower stalked; flowers about 1″ broad, white; petals generally present, sometimes wanting in the later flowers; pedicels slender, spreading, 2″–3″ long in fruit; pod flat, short-oval or orbicular, minutely winged above; cotyledons accumbent.

Common in waste and cultivated grounds. Naturalized from North America or the West Indies. Flowers nearly throughout the year. [*L. apetalum* of Millspaugh.]

Lepidium ruderàle L., European, with apetalous flowers and wingless pods, recorded by Hemsley as found on roadsides in Bermuda by Lane, has not been seen here by subsequent collectors. Hemsley further cites Reade as reporting the plant as common, but in Reade's book of 1883, only *L. virginicum* appears.

Lepidium sativum L., GARDEN PEPPER-GRASS, European, with large oblong pods winged all around, is grown in gardens for its pungent foliage, used as a crudiment.

2. CARÀRA Medic.

Annual or biennial, diffuse herbs, with mostly pinnatifid leaves, and small whitish flowers. Silicles small, didymous, laterally compressed, sessile. Stamens often only 2 or 4. Valves of the capsule oblong or subglobose, obtuse at each end, indehiscent, falling away from the septum at maturity. Seeds 1 in each cell: cotyledons narrow, incumbent or conduplicate. [Ancient Italian name.] About 6 species, of wide distribution. Type species: *Carara Coronopus* (L.) Medic.

1. Carara dídyma (L.) Britton. LESSER WART-CRESS. STAR-OF-THE-EARTH. (Fig. 169.) Tufted, spreading on the ground, sparingly pubescent. Stems 2′–16′ long; leaves deeply 1–2-pinnatifid; flowers white, racemose; pedicels slender, 1″–1½″ long in fruit; pod about 1″ broad and slightly more than ½″ high; valves obtuse at each end and readily separating into 2 ovoid nutlets. [*Lepidium didymum* L.; *Senebiera didyma* Pers.]

Common in waste and cultivated grounds. Naturalized from Europe. Widely naturalized in North America and the West Indies. Flowers throughout the year. Often an abundant weed, growing closely appressed to the ground.



3. THLÁSPI L.

Erect glabrous herbs, with entire or dentate leaves, those of the stem, or at least the upper ones, auriculate and clasping. Flowers white or purplish. Siliques obcuneate, obcordate, or oblong-orbicular, mostly emarginate, flattened at right angles to the narrow septum, crested or winged. Valves dehiscent. Seeds 2 or several in each cell, wingless. Cotyledons accumbent. [Greek, to flatten, from the flat pod.] A genus of about 25 species, natives of temperate, arctic and alpine regions, the following typical.



1. Thlaspi arvénse L. FIELD PENNY-CRESS. (Fig. 170.) Annual, glabrous, 6′–20′ high. Basal leaves petioled, oblanceolate, early deciduous; stem-leaves oblong or lanceolate, sparingly dentate, the upper clasping the stem by an auricled base; flowers white, about ½″ broad; pedicels spreading or curved upward, slender, 5″–10″ long in fruit; pods nearly orbicular, 4″–6″ broad, very flat, broadly winged all around, notched at the apex, in long racemes; style minute, or none; seeds about 6 in each cell.

Cultivated grounds, Agricultural Gardens, 1911. Introduced. Native of Europe and Asia. Widely naturalized in North America. Flowers in spring.

4. **KÒNIGA** Adans.

Perennial herbs or shrubs, pubescent or canescent with forked hairs, with entire leaves, and small white flowers in terminal racemes. Petals obovate, entire. Filaments slender, not toothed, but with two small glands at the base. Silicle compressed, oval or orbicular. Seeds 1 in each cell. Cotyledons accumbent. [Name in honor of Charles Konig, a curator of the British Museum.] About 4 species, natives of the Mediterranean region, the following typical.

1. Koniga marítima (L.) R. Br. SWEET ALYSSUM. SEASIDE KONIGA. (Fig. 171.) Procumbent or ascending, 4′–12′ high, minutely pubescent. Stem-leaves nearly sessile, lanceolate or linear, ½′–2′ long; basal leaves oblanceolate, narrowed into a petiole; flowers fragrant, about 2″ broad; pedicels 3″–4″ long in fruit; pods glabrous, pointed 1″–1½″ long; calyx deciduous; stamens not appendaged. [*Clypeola maritima* L.; *Alyssum maritimum* Lam.]

Frequent on roadsides and in waste grounds. Escaped from flower gardens and naturalized. Native of Europe. Escaped from cultivation in the United States. Flowers from spring to autumn. Much planted in garden borders.



5. **MICROSTÌGMA** Trauttv. [MATTHIOLA R. Br., not L.]

Herbs, or some species low shrubs, finely and densely stellate-pubescent, with oblong to linear leaves and large, bractless, racemose flowers. Sepals erect, two of them saccate at the base. Petals long-clawed, the blades spreading. Stigmas erect, connivent, sessile. Silique elongated. Seeds flattened, sometimes margined, borne in single rows; cotyledons accumbent. [Greek, small stigma.] About 30 species, of the Old World, most abundant in Europe and western Asia, one African. Type species: *Microstigma Bungei* Trauttv.

1. Microstigma incàna (L.) Britton. WILD STOCK. GILLIFLOWER. (Fig. 172.) Perennial, somewhat woody below, branched, 2° high or less, the branches stiff. Leaves oblong-linear, blunt at the apex, narrowed into petioles, entire, hoary, 2′–6′ long, ½′ wide or less; flowers purple, conspicuous, with obovate petal-blades; silique 4′–5′ long, narrowly linear, nearly cylindric. [*Cheiranthus incanus* L.; *Matthiola incana* R. Br.]

Coastal cliffs and rocks. Naturalized from Europe, locally abundant, especially in Warwick. Flowers in spring and summer, sometimes also in the autumn. Cultivated in flower-gardens, both in single-flowered and double-flowered races, some of which are annual or biennial in duration.



6. **ERÝSIMUM** [Tourn.] L.

Annual or biennial, mostly tall herbs, with simple entire lobed or pinnatifid leaves, and yellow white or rarely pink flowers. Petals generally elongated. Siliques elongated, linear, many-seeded. Valves mostly 3-nerved, dehiscent. Stigma nearly simple, or with 2 short lobes. Seeds in 1 row in each cell of the pod, oblong, marginless. Cotyledons incumbent. [Greek, name of some garden plant.] A genus of a few species, natives of the Old World, mostly in Europe and Asia, the following rather common weed typical.



1. Erysimum officinàle L. HEDGE MUSTARD. (Fig. 173.) Erect, 1°–3° high, with rigid spreading branches. Leaves runcinate-pinnatifid, the lower petioled, the upper nearly sessile; lobes oblong, ovate or lanceolate, the lower ones often recurved; pedicels about 1″ long, erect in fruit; flowers yellow, 1½″ broad; pods linear, acuminate, glabrous or slightly hairy, closely appressed; valves with a strong prominent midrib. [*Sisymbrium officinale* Scop.; *S. officinale leiocarpum* DC.]

Common in waste and cultivated grounds. Naturalized from Europe. Widely naturalized in North America. Flowers nearly throughout the year.

7. BRÁSSICA [Tourn.] L.

Erect branching herbs, with pinnatifid basal leaves, and showy yellow flowers in elongated racemes. Siliques elongated, sessile, terete or 4-sided, tipped with an indehiscent conic usually 1-seeded beak. Valves convex, 1–3-nerved. Seeds in 1 row in each cell, oblong, marginless; cotyledons conduplicate. [Latin name of the Cabbage.] About 80 species, natives of Europe, Asia and northern Africa. Type species: *Brassica oleracea* L.

Pods 4-sided, appressed, 5″–8″ long. 1. *B. nigra.*
Pods torulose, ascending, 1′–1½′ long. 2. *B. integrifolia.*

1. Brassica nìgra (L.) Koch. BLACK MUSTARD. (Fig. 174.) Erect, 1½°–5° high, freely branching. Lower leaves slender-petioled, with 1 terminal large lobe and 2–4 smaller lateral ones, dentate all around, the uppermost reduced to lanceolate or oblong entire blades; flowers bright yellow, 3″–5″ broad; pedicels slender, appressed, 2″ long in fruit; pods narrowly linear, 4-sided, 5″–8″ long, ½″ wide, appressed; beak slender, 1″–2″ long; seeds dark brown. [*Sinapis nigra* L.]

Common as a weed in cultivated grounds. Naturalized from Europe. Widely naturalized in North America. Flowers nearly throughout the year. Occasionally cultivated for its seeds.



2. Brassica integrifòlia (West) O. E. Schulz. WILD MUSTARD. (Fig. 175.) Annual, pale green, glabrous, or very sparsely pubescent below, branched, 1°–3° tall. Lower and basal leaves obovate, petioled, 6′–1° long, coarsely dentate, the upper much smaller, oblong to linear, mostly entire; racemes loosely many-flowered; petals light yellow, 3″–4″ long; fruiting pedicels ascending, 2″–6″ long; siliques linear, torulose, 1′–1½′ long, slender-beaked.



Roadsides and cultivated grounds. Naturalized. West Indies and continental tropical America. Native of southeastern Asia.

Brassica campèstris L., TURNIP, and **Brassica oleràcea** L., CABBAGE, are extensively grown as garden vegetables; KALE, a variety of Cabbage not forming heads, is occasionally grown. Both are natives of Europe.

8. SINÀPIS L.

Annual or biennial, usually erect, branching more or less hispid herbs, with pinnatifid or lobed leaves, and rather large, mostly yellow flowers in terminal racemes. Siliques linear, nearly terete, constricted between the seeds, sessile in the calyx, tipped with a flat sword-like beak which sometimes contains a seed near its base, its valves 3–5-nerved. Seeds oblong or subglobose, not winged nor margined. Cotyledons conduplicate. [Name Greek, said to come from the Celtic for turnip.] About 5 species, natives of southern Europe. Type species: *Sinapis alba* L.



1. Sinapis arvénsis L. CHARLOCK. WILD MUSTARD. (Fig. 176.) Erect, 1°–2½° high, hispid with scattered stiff hairs, or glabrate. Leaves similar to those of *Brassica nigra* but generally not so much pinnatifid; flowers 5″–8″ broad; pedicels stout; pods glabrous, spreading or ascending, somewhat constricted between the seeds, 5″–8″ long, 1″ wide, tipped with a flattened elongated conic often 1-seeded beak 5″–6″ long, the valves strongly nerved. [*Brassica Sinapistrum* Boiss.]

Waste and cultivated grounds. Naturalized. Native of the Old World. Flowers in spring, occasionally later.

9. DIPLOTÁXIS DC.

Herbs, with pinnatifid or lobed leaves, and rather large yellow flowers in terminal racemes. Silique elongated, linear, flat or flattish, short-beaked or beakless, the valves mostly 1-nerved. Style usually slender. Seeds in two complete or incomplete rows in each cavity of the silique, marginless; cotyledons conduplicate. [Greek, referring to the double rows of seeds.] About 20 species, natives of the Old World. Type species: *Diplotaxis tenuifolia* (L.) DC. The flattened pods with seeds in two rows distinguish this genus from the Mustards.



1. Diplotaxis murâlis (L.) DC. Sand Rocket. (Fig. 177.) Branched from the base, sparingly hispid or glabrous, leafy only below. Leaves oblanceolate, sinuate-lobed or pinnatifid, 2′–4′ long, narrowed at the base, mostly slender-petioled; flowers 6″–8″ broad; pod about 1′ long and 1″ wide, erect, flattish; fruiting pedicels, 4″–8″ long.

Abundant in waste and cultivated grounds on St. David's Island, 1909 and in cultivated ground near Wreck Hill, 1912. Naturalized from Europe. Naturalized in the eastern United States. Flowers in spring. This plant may become a pernicious weed, as the seeds germinate readily.

10. CAKÌLE [Tourn.] Mill.

Annual, glabrous fleshy branching herbs, with petioled leaves and purplish racemose flowers. Siliques elongated, sessile, flattened or ridged, indehiscent, 2-jointed, the joints 1-celled and mostly 1-seeded. Style none; cotyledons accumbent. [Old Arabic name.] A genus of several species, natives of sea and lake shores of Europe and North America. Type species: *Bunias Cakile* L. The curious two-jointed pods which do not split open are an interesting feature of these plants.

1. Cakile lanceolàta (Willd.) O. E. Schulz. SOUTHERN SEA ROCKET. SCURVY GRASS. (Fig. 178.) Erect or ascending, often much branched, 2½° high or less. Basal and lower leaves broadly oblong, obtuse, 2′–3′ long, coarsely crenate-dentate; upper leaves smaller, narrowly obovate to oblong, crenate-dentate, or entire; flowers pale purplish, 3″–5″ broad; fruiting racemes often 1° long; fruiting pedicels stout, 2″–3″ long; pod 8″–12″ long, its upper joint longer than the lower. [*Raphanus lanceolatus* Willd.; *Cakile aequalis* L'Her.; *Cochlaria officinalis* of Jones; *Cakile maritima* of H. B. Small.]

Sea-beaches, sand dunes and coastal rocks. Native. Florida and the West Indies. Flowers from spring until autumn. Presumably transported to Bermuda by floating.



11. **RAPHANUS** [Tourn.] L.

Mainly biennial herbs, with lyrate leaves and showy flowers. Silique elongated-linear, coriaceous, fleshy or corky, spongy between the seeds, indehiscent. Seeds subglobose; cotyledons conduplicate. [Greek, quick-appearing, from its rapid germination.] About 6 species, of Europe and Asia. Type species: *Raphanus sativus* L.

Flowers yellow, fading white; pod grooved, 4–10-seeded. 1. *R. Raphanistrum.*
Flowers pink or white; pod not grooved, 2–3-seeded. 2. *R. sativus.*



1. Raphanus Raphanístrum L. WILD RADISH. JOINTED OR WHITE CHARLOCK. (Fig. 179.) Biennial or annual from a slender root, 1°–3° high, sparsely pubescent or rarely glabrous. Basal and lower leaves lyrate-pinnatifid, 4′–8′ long, with a large terminal lobe and 4–6 pairs of successively smaller lateral ones, all crenate or dentate; upper leaves small, oblong; flowers 5″–10″ broad, yellow, fading to white, purplish-veined; pedicels 3″–8″ long in fruit; pods 1′–1½′ long, 6–10-seeded, constricted between the seeds when dry, tipped with a conic beak.

Waste grounds. Naturalized from Europe. Widely naturalized in North America. Flowers nearly throughout the year.



2. Raphanus sativus L. GARDEN RADISH. (Fig. 180.) Similar to the last, but flowers pink or white. Root deep, fusiform or napiform, fleshy; pods fleshy, 2–3-seeded, not longitudinally grooved, often equalled or exceeded by the long conic beak.

Extensively cultivated, and spontaneous in gardens or fields, rarely in waste places. Native of Asia. Flowers nearly throughout the year. Several kinds are grown as garden crops.

12. **BÚRSA** [Siegesb.] Weber.

Annual or winter-annual erect herbs, pubescent with forked hairs, the basal leaves tufted. Flowers racemose, small, white. Silicles cuneate, obcordate or triangular, compressed at right angles with the septum, their valves boat-shaped, keeled. Style short. Seeds numerous, marginless; cotyledons accumbent. [Middle Latin, purse, from the shape of the pod.] About 4 species. natives of the northern hemisphere, the following typical.

1. Bursa Bursa-pastòris (L.) Britton. SHEPHERD'S PURSE. (Fig. 181.) Branching, 6′–2° high from a deep root, pubescent below, mainly glabrous above. Basal leaves lobed, pinnatifid, or rarely entire, 2′–6′ long; stem-leaves few, lanceolate, auricled; flowers about 1″ long; pedicels 5″–8″ long in fruit; pods triangular, cuneate at the base, truncate or emarginate, 2″–4″ long; seeds 10 or 12 in each cell. [*Thlaspi Bursa-pastoris* L.; *Capsella Bursa-pastoris* Medic.]

Common in waste and cultivated grounds. Naturalized from Europe. Widely naturalized in America. Flowers all the year round.



Sisymbrium Nastùrtium-aquáticum L., WATER-CRESS, European, is occasionally grown in tanks or pools as a vegetable. Lefroy records it as in his time abundant in the water channels of Pembroke Marsh, but recent collectors have failed to find it there, and it probably disappeared after this marsh was made brackish by opening a drainage canal from it westward to the salt water, through which the sea has access to the marsh at high tides. [*Nasturtium officinale* R. Br., *Radicula Nasturtium-aquaticum* Britten & Rendle.]

Armoràcia Armoràcia (L.) Cockerell [*Nasturtium Armoracia* Fries], HORSERADISH, European, is grown in gardens for its large pungent roots. It has large lanceolate upright leaves and conspicuous white flowers.

Malcolmia marítima (L.) R. Br., VIRGINIAN STOCK, of the Mediterranean region, grown in flower-gardens, is a slightly pubescent annual, 10′–15′ high, with oblong, blunt, entire leaves ½′–2′ long, and variously colored, racemose flowers 8″–10″ broad, the nearly sessile linear pods 2′–3′ long. [*Cheiranthus maritimus* L.]

Cheiranthus Cheirí L., WALL-FLOWER, of southern Europe, also a garden flower, is a somewhat pubescent perennial, 1°–2° tall, with lanceolate, acutish entire leaves, and large, yellow or sometimes purple, racemose flowers, its linear pods stalked.

Iberis violàcea R. Br., CANDYTUFT, origin unknown, annual, about 3′ high, with spatulate toothed leaves, and corymbose purple flowers, is recorded by Lefroy as naturalized on St. George's Island growing along roadsides and in waste places. It is also mentioned by H. B. Small.

Iberis amàra L., WHITE ANNUAL CANDYTUFT, European, a low annual with white or purplish corymbose flowers, the inflorescence elongating and becoming racemose in fruit, the pods 2-lobed, is grown in flower-gardens.

Iberis umbellàta L., PURPLE ANNUAL CANDYTUFT, of southern Europe, an annual up to 18′ high, with corymbose purplish or violet flowers, the clusters of sharply 2-lobed pods also corymbose, not elongating, is also grown in flower-gardens.

Arabis alpìna L., ALPINE ROCK-CRESS, of high boreal regions, was seen at Paget Rectory in 1914, where it had been growing for several years. It is a low perennial, with tufted obovate or spatulate, dentate, obtuse, finely stellate-pubescent leaves 1′–2½′ long, the white, often double, flowers racemose, the linear flat pods about 1′ long.

Alyssum saxátile L., GOLDEN-TUFT, European, a whitish-tomentulose perennial with slender stems about 1° high, the lanceolate or oblanceolate, nodulate-margined leaves 1′–2½′ long, the small, bright yellow flowers in terminal racemes, was seen at Paget Rectory in 1914.

Camelina satìva (L.) Crantz, FALSE FLAX, European, annual, glabrous, 1°–2° high, with lanceolate, sometimes sagittate leaves 1′–3′ long, small, yellow, racemose flowers, the obovoid, slender-pedicelled pods about 3″ broad, their valves convex, has been collected as a waif. [*Myagrum sativum* L.]

Family 4. **CAPPARIDÀCEAE** Lindl.

CAPER FAMILY.

Herbs, shrubs, some tropical species trees, with alternate or very rarely opposite leaves, and regular or irregular, mostly perfect flowers. Sepals 4–8. Petals 4 (rarely none). Receptacle elongated or short. Stamens 6–∞, not tetradynamous, inserted on the receptacle; anthers oblong. Style generally short, ovules ∞, on parietal placentae. Fruit a capsule or berry. Seeds mainly reniform in our species; endosperm none; embryo generally coiled. About 35 genera and 450 species, mostly of warm regions.

1. **CLEÒME** L.

Herbs or low shrubs. Leaves digitately 3–5-foliolate, or simple. Flowers mostly racemose. Calyx 4-divided or of 4 sepals, often persistent. Petals 4, cruciate, nearly equal, entire, more or less clawed. Receptacle short, slightly prolonged above the petal-bases. Stamens 6 (rarely 4), or numerous, inserted on the receptacle. Ovary stalked, with a gland at its base. Capsule elongated, many-seeded. [Derivation uncertain.] About 75 species, mainly natives of tropical regions, especially American and African. Type species: *Cleome gynandra* L.

Stamens 6, borne on the gynophore; petals white to pink. 1. *C. gynandra.*
Stamens about 20, borne below the gynophore; petals yellow. 2. *C. viscosa.*



1. Cleome gynándra L. SMALL SPIDER-FLOWER. (Fig. 182.) Annual, bright green, clammy-pubescent. Stem 1½°–3° tall, branching; leaf-blades palmately 3–5-foliolate; petioles longer than the leaflets; leaflets ½′–2½′ long, oval to obovate, acute or short-acuminate, serrulate; racemes 4′–16′ long; bracts suborbicular, oval or broadly obovate; sepals lanceolate, acuminate; petals white or pink, 2½″–5″ long, their blades oval, longer than the claws; stamens 6; capsules linear, 1½′–2½′ long, surpassing the glandular pedicel in length; seeds coarsely rugose and muricate. [*Cleome pentaphylla* L.; *Gynandropsis pentaphylla* DC.]

Abundant as a weed in cultivated grounds. Naturalized from the Old World tropics. Widely naturalized in the southern United States and West Indies. Flowers from spring to autumn.



2. Cleome viscòsa L. VISCID SPIDER-FLOWER. (Fig. 183.) Annual, erect, branched, viscid-glandular, 1°–3° tall. Leaves petioled, the blades palmately 3–5-foliolate; leaflets obovate-oblong, ½′–3′ long, acute, or acutish, thin; flowers axillary, 6″–8″ broad; petals bright yellow; stamens about 20, equalling the petals; capsule linear, about 3′ long, rough-glandular, striate-ribbed, sessile; seeds echinate.

Common in waste and cultivated grounds. Naturalized from the Old World tropics. Naturalized in the West Indies. Flowers in spring and summer. [*Polanisia viscosa* DC.]

Cleome speciòsa DC., CANDELABRA PLANT, Mexican, a tall species with large purple flowers, is grown in flower-gardens. Lefroy erroneously refers to *Cleome pungens* Willd. (*C. spinosa* L.) as a white variety of this; it is a separate species, apparently not observed as yet in Bermuda, but as a common weed in warm countries it may be expected to be introduced at any time.

Steriphoma elliptica Spreng., recorded by Jones in 1873, and mentioned by Lefroy as received from Trinidad, where it is native, in 1874, and flowered with him, is a shrub with oblong leaves and spatulate petals.

Capparis Cynophallòphora L., BLACK WILLOW, West Indian and Floridian, is represented by a large tree at Par-la-Ville, Hamilton, flowering profusely in summer; it has oblong entire, firm leaves 4′ long or less, shining above, their under surfaces and the inflorescence silvery-scaly, the petals white. [*Capparis torulosa* of H. B. Small; *C. jamaicensis* Jacq.]

Family 5. **RESEDÀCEAE** S. F. Gray.

MIGNONETTE FAMILY.

Herbs, rarely woody, with alternate or fascicled leaves, gland-like stipules and racemose or spicate, bracted flowers. Flowers unsymmetrical. Calyx 4–7-parted, inequilateral. Petals generally 4–7, hypogynous. Disk fleshy, hypogynous, 1-sided. Stamens 3–40; filaments generally unequal. Ovary 1, compound, of 3–6 carpels; styles or sessile stigmas 3–6; ovules ∞. Fruit capsular in all but 1 genus. Seeds reniform, without endosperm; cotyledons incumbent. Six genera and about 65 species, natives of the Old World.

Reseda odoràta L., MIGNONETTE, Egyptian, a low annual occasionally seen in flower-gardens, has wedge-shaped, entire or 3-lobed leaves and yellowish-green fragrant flowers with deeply lobed petals.

Reseda alba L., WHITE CUT-LEAVED MIGNONETTE, European, erect up to 2° high, with deeply pinnatifid leaves and long narrow racemes of small, white flowers, is also grown in flower-gardens.

Family 6. **MORINGÀCEAE** Dumort.

HORSERADISH-TREE FAMILY.

Trees, with a gummy bark. Leaves alternate, deciduous, 2–3-pinnate, the divisions and leaflets opposite, the latter entire: stipules wanting or mere glands. Flowers perfect, slightly irregular, in axillary panicles. Calyx of 5 unequal reflexed-spreading sepals on the edge of the short cup-like hypanthium. Corolla of 5 petals resembling the sepals, the lower petal reflexed, the upper one more or less erect. Androecium of 5 stamens inserted on the margin of the hypanthium, and 5 staminodia. Filaments distinct. Anthers 1-celled, opening lengthwise. Gynoecium 3-carpellary, stalked. Ovary 1-celled, with 3 parietal placentae; styles united; stigma minute. Ovules numerous, anatropous, pendulous, in two series on each placenta. Capsule elongated, 3–6-angled, somewhat torulose, beaked, 3-valved. Seeds relatively large, 3-winged or wingless; endosperm wanting. Only the genus *Moringa*, with 3 species, natives of the Old World tropics.

Moringa Moringa (L.) J. K. Small [*M. pterygosperma* Gaertn.], HORSERADISH-TREE, a small tree with large decompound leaves and panicled white flowers, the 3-angled linear pods about 1° long, has been introduced and planted for ornament and interest. It yields the Ben oil, used by watchmakers.

Order 16. SARRACENIÀLES.

Insectivorous plants secreting a viscid liquid, with basal leaves and perfect scapose flowers. Corolla choripetalous. Sepals mostly distinct. Stamens usually hypogynous. Ovary compound, superior.

The order is known only as having been represented in Bermuda by the PITCHER-PLANT, **Sarracenia purpurea** L., North American, with a tuft of hollow leaves and a large nodding purple flower, introduced at Mount Langton and died after blooming as recorded by Lefroy.

Order 17. ROSÀLES.

Herbs, shrubs or trees, the flowers usually petaliferous and the petals distinct. Stamens mostly perigynous or epigynous. Sepals mainly united or confluent with the concave receptacle. Carpels one or more, distinct or sometimes united into a compound ovary.

† *Endosperm present, usually copious and fleshy; leaves mostly without stipules.*
Herbs, with fleshy or succulent tissue.
Carpels as many as the calyx-segments; stamens as many or twice as many. Fam. 1. CRASSULACEAE.
Carpels fewer than the calyx-segments. Fam. 2. SAXIFRAGACEAE.
Shrubs or trees.
Leaves opposite. Fam. 3. HYDRANGEACEAE.
Leaves alternate.
Fruit a 1-celled berry. Fam. 4. GROSSULARIACEAE.
Fruit capsular, or indehiscent. Fam. 5. PITTOSPORACEAE.
†† *Endosperm none, or very little; leaves mostly with stipules.*
‡ Trees with broad leaves and small monoecious densely capitate flowers. Fam. 6. PLATANACEAE.
‡‡ Flowers perfect, or if dioecious or monoecious not densely capitate.
a. Flowers regular.
Pistils several or numerous.
Carpels distinct, rarely adnate to the calyx, ripening into follicles or achenes. Fam. 7. ROSACEAE.
Carpels united, enclosed by the calyx-tube and adnate to it, the fruit a pome. Fam. 8. MALACEAE.
Pistil only 1.
Ovary 2-ovuled; fruit a drupe; leaves simple. Fam. 9. AMYGDALACEAE.
Ovary several-ovuled; fruit a legume; leaves 2-3-pinnate.

Petals valvate in the bud. (Petals imbricated in the bud; *Gleditsia* in the Caesalpiniaceae). — Fam. 10. MIMOSACEAE.

b. Flowers irregular (nearly or quite regular in *Gleditsia*).

Fruit a legume; upper petal enclosed by the lateral ones in the bud; leaves compound. — Fam. 11. CAESALPINIACEAE.

Fruit a legume or loment; upper petal enclosing the lateral ones in the bud; leaves compound (sometimes 1-foliolate). — Fam. 12. FABACEAE.

Family 1. **CRASSULÀCEAE** DC.

ORPINE FAMILY.

Herbs, or somewhat shrubby plants, mostly fleshy or succulent, with cymose or rarely solitary regular or symmetrical flowers. Stipules none. Calyx persistent, free from the ovary or ovaries, 4–5-cleft or 4–5-parted. Petals equal in number to the calyx-lobes, distinct, or slightly united at the base. Stamens of the same number or twice as many as the petals; anthers longitudinally dehiscent. Carpels equal in number to the sepals, distinct, or united below; styles subulate or filiform; ovules numerous. Follicles 1-celled, dehiscent along the ventral suture. Seeds minute; endosperm fleshy; cotyledons short, obtuse. About 30 genera and 600 species, of wide geographic distribution.

Calyx much inflated, 4-toothed. — 1. *Bryophyllum*.
Calyx scarcely inflated, 4-parted. — 2. *Kalanchoë*.

1. **BRYOPHÝLLUM** Salisb.

Erect herbs, the leaves opposite, simple or pinnately compound; the leaflets mostly toothed. Flowers perfect, often showy, nodding, in cymes or panicles opposite the branches. Calyx inflated, 4-toothed. Corolla nearly campanulate, or urn-shaped, the narrow limb with 4 spreading lobes. Stamens 8, in 2 series, adnate to about the middle of the corolla-tube; filaments filiform; anthers mostly exserted. Carpels 4, distinct or partially united. Ovules many. Follicles 4. Seeds numerous. [Greek, sprouting leaf.] Four known species, of South Africa and Madagascar, the following typical.

1. Bryophyllum pinnàtum (Lam.) Kurz. LIFE PLANT. FLOPPERS. (Fig. 184.) Perennial, glabrous. Stems 1°–6° tall, branched; leaf-blades often pinnately compound, 4′–12′ long; leaflets oblong, oval or elliptic, obtuse, crenate, the terminal one several times longer than the lateral ones; panicles 4′–18′ long, conspicuous; calyx bladder-like, finally oblong-campanulate, 1½′ long, glabrous; corolla reddish, twice as long as the calyx or shorter, its lobes lanceolate or narrowly ovate, acute. [*Cotyledon pinnatum* Lam.; *B. calycinum* Salisb.]



Walls, thickets, woodlands and waste grounds, almost ubiquitous in Bermuda, striking roots and growing freely from leaves, stems or their fragments. Naturalized from Old World tropics, recorded as first introduced in 1813, soon becoming a pernicious weed. Naturalized in Florida and the West Indies. Flowers from winter to summer.

2. **KALANCHÒË** Adans.

Erect herbs, sometimes a little woody, with opposite leaves and panicled flowers, often showy. Calyx 4-parted, shorter than the corolla. Corolla salver-form, with a swollen tube and a spreading, 4-parted limb. Stamens usually 8, in 2 series on the corolla-tube, the filaments very short. Carpels 4, lanceolate, adnate to the base of the corolla-tube; ovules many. Follicles many-seeded. [Chinese name.] Twenty species or more, all but the following natives of Asia and Africa. Type species: *Cotyledon laciniata* L.



1. Kalanchoë brasiliénsis Camb. BRAZILIAN KALANCHOË. (Fig. 185.) Herbaceous, perennial, 1°–3° high, glandular-pubescent above. Leaves ovate to obovate, short-petioled, 2′–4′ long, faintly pinnately veined, crenate-dentate, or the upper pairs lanceolate, much smaller and entire; inflorescence 4′–12′ long, cymose-paniculate, its branches nearly erect, the bracts very small; flowers yellow, 6″–8″ long; sepals lanceolate, glandular-pubescent, acute; corolla-tube 2–3 times as long as the calyx, the limb spreading; stamens borne on the corolla-tube a little above the middle, not exserted; follicles about 3″ long, the brown seeds oblong.

Agar's Island, 1913, collected by F. S. Collins. Native of Brazil. Naturalized in Cuba and St. Thomas. Flowers in summer.

Kalanchoë Afzeliàna Britten (*Vereia crenata* Andr., not *K. crenata* Haw.), mentioned by Reade as a garden plant, is 2°–4° high, with large crenate basal leaves, and bright yellow flowers.

Echeveria gibbiflòra DC., **E. sanguínea** Morren, and **E. metállica** Hort., Mexican species with beautiful tufts of fleshy, entire, basal leaves, the red or yellow flowers on erect stems, in 1-sided cymes, have occasionally been planted for ornament.

Sempervivum species, HOUSELEEKS, European, have been grown for interest, but are not long-enduring in Bermuda.

Sedum àcre L., MOSSY STONECROP, European, a small trailer with minute thick imbricated leaves, and bright yellow cymose flowers, is said by H. B. Small to be "spreading freely and may be found on wall-faces of road-cuttings, Hamilton and Warwick, frequently placed on graves." It is also mentioned by Reade, and Lefroy records it as introduced at Mt. Langton, prior to 1875, but it has not come under my observation in Bermuda.

Sedum mexicànum Britton, YELLOW MEXICAN STONECROP, occasionally planted for ornament, is a weak, tufted species about 6′ high, with opposite or whorled, linear terete leaves about ½′ long and bright yellow flowers 4″–5″ wide in compound cymes. [*S. sarmentosum* Masters, not Bunge.]

Many other Stonecrops, planted at Paget Rectory, died out.

Family 2. **SAXIFRAGACEAE** Dumort.

Saxifrage Family.

Herbs. Flowers perfect or polygamo-dioecious. Calyx mostly 5-lobed or 5-parted, free, or adnate to the ovary, usually persistent. Petals usually 4 or 5, rarely none. Stamens equal in number to or twice as many as the petals, in apetalous species as many or twice as many as the calyx-lobes, perigynous or epigynous; filaments distinct. Disk generally present. Carpels usually 2, distinct or united, but upper portion free, mostly fewer than the stamens. Seeds commonly numerous; endosperm generally copious, fleshy; embryo small, terete. About 90 genera and 650 species, of wide geographic distribution.

Sekika sarmentòsa (L.) Moench, Strawberry Geranium, Asiatic, a perennial stoloniferous herb, with tufted basal nearly orbicular leaves, and small panicled white flowers borne on a scape 1°–2° high, the lower petals drooping, is occasional in flower-gardens. [*Saxifraga sarmentosa* L.]

Heuchera sanguìnea Engelm., Red Heuchera, North American, has been grown, but does not succeed; it is a low perennial, with basal, reniform, lobed leaves, and small red flowers, panicled on slender scapes.

Family 3. **HYDRANGEÀCEAE** Dumort.

Hydrangea Family.

Shrubs or trees with simple opposite leaves and no stipules. Flowers perfect or the exterior ones of the clusters sterile and conspicuous. Petals and sepals generally 5. Stamens twice as many or numerous, epigynous. Carpels 2–10, wholly united or the apex free, the lower half at least enclosed by and adnate to the calyx. Seeds numerous; endosperm generally copious; embryo small. About 16 genera and 80 species, of temperate and tropical regions.

Philadelphus coronàrius L., Garden Syringa, European, a shrub about 7° high, with ovate or oval thin acute serrate deciduous leaves 2′–4′ long, the white fragrant flowers 1′–1½′ wide, in terminal racemes, with 5 petals, many stamens and 3–5 styles, the fruit a top-shaped capsule, is grown for ornament.

Hydrangea hortènsis Smith, Hydrangea, Asiatic, grown for ornament, is a shrub 4°–6° high, glabrous or very nearly so, with ovate, acute or acuminate, serrate leaves 8′ long or less, the white, blue or pink flowers in large clusters.

Deutzia scàbra Thunb., Rough Deutzia, Asiatic, a shrub 5° or 6° high, with ovate-lanceolate leaves, stellately rough-pubescent on both sides, and racemose white flowers, is grown for ornament.

Deutzia Lemoìnei, a hybrid between *D. gracilis* and *D. parviflora*, with corymbose flowers, is also grown.

Family 4. **GROSSULARIÀCEAE** Dumort.

Gooseberry Family.

Shrubs, with often fascicled usually lobed petioled leaves, and racemose or subsolitary axillary or lateral flowers, the pedicels bracteolate. Calyx-tube adnate to the ovary, the limb 4–5-lobed, often colored. Petals 4 or 5, inserted on the throat of the calyx, small, scale-like, often included.

Stamens 4 or 5, inserted with the petals. Ovary 1-celled; styles 2, distinct or united. Berry globose or ovoid, pulpy, the calyx persistent on its summit. Seeds obscurely angled, their outer coat gelatinous, the inner crustaceous. Two genera and about 120 species, mostly of the temperate zones.

Ribes vulgàre Lam., GARDEN CURRANT, European, has been planted, but the climate is too warm for its successful cultivation. Lefroy refers to it as *Ribes rubrum.*

Grossularia reclinàta (L.) Mill., GARDEN GOOSEBERRY, has also been planted but without success. [*Ribes Grossularia* L.]

Family 5. **PITTOSPORÀCEAE** Lindl.

PITTOSPORUM FAMILY.

Shrubs or trees, with alternate, estipulate leaves and clustered or solitary regular and perfect flowers. Sepals 5. Petals 5, hypogynous, imbricated. Stamens 5, distinct, hypogynous, alternate with the stamens, the anthers versatile. Ovary compound; style simple; stigma terminal; ovules numerous, anatropous. Fruit capsular and loculicidally dehiscent, or hairy-like and indehiscent. There are no native nor naturalized species in Bermuda.

Pittosporum undulàtum Vent., MOCK ORANGE, native of New Holland, is commonly planted in parks and gardens, forming a tree up to 20° high with a trunk sometimes 8′ in diameter, and thrives luxuriantly. Its oblong-lanceolate evergreen leaves, borne in tufts at the ends of the twigs are pointed at both ends, glabrous and 3 to 5 inches long; the axillary stalked flowers are small, white and fragrant, followed by capsular fruits which split into two reflexed round leathery valves exposing the several glutinous seeds.

Pittosporum Tobìra (Thunb.) Ait., TOBIRA, Japanese, an elegant shrub 6°–10° high, the young twigs pubescent, the obovate-cuneate, obtuse, coriaceous leaves clustered at the ends of the twigs, 2′–3′ long, dark green above, pale green beneath, is occasionally planted for ornament; its flowers are white, fragrant, about ½′ long, in terminal sessile umbels, the slightly pubescent capsules 5″–6″ long. The old tree at Bishop's Lodge was 46′ in trunk circumference in 1914. [*Euonymus Tobira* Thunb.]

Pittosporum coriàceum Ait., LEATHERY-LEAVED PITTOSPORUM, of Madeira, recorded by Lefroy, has oval, obtuse, leathery leaves 3′–4′ long and large white flowers. The Bishop's Lodge plant mentioned by H. B. Small under this name is *P. Tobira,* and Lefroy's record may also be erroneous.

Pittosporum tenuifòlium Gaertn., THIN-LEAVED PITTOSPORUM, of New Zealand, taken to Mt. Langton from the New York Botanical Garden in 1913, has thin, acute leaves 1′–2′ long, brown flowers and black seeds. It forms, in New Zealand, a tree up to 40° high.

Pittosporum eriolòma Moore & Muell., WOOLLY PITTOSPORUM, of Lord Howe's Island, also taken to Mt. Langton from the New York Botanical Garden in 1913, is a shrub, becoming 12° high, with oblong-lanceolate, shining leaves 1′–3′ long, the corymbose flowers about 1′ broad, with woolly-margined sepals and narrow petals.

Family 6. **PLATANÀCEAE** Lindl.

PLANE-TREE FAMILY.

Large trees, with alternate petioled palmately lobed and veined leaves, the hollowed petiole-bases enclosing the buds for the following season, the bark exfoliating, and small green monoecious flowers in dense globular heads. Receptacle somewhat fleshy. Calyx of 3–8 externally pubescent minute sepals. Corolla of as many thin glabrous petals. Staminate flowers with stamens as many as the sepals and opposite them; filaments short; anthers oblong or linear, longitudinally dehiscent. Pistillate flowers with 2–8 distinct pistils; ovary linear, 1-celled; style elongated; stigma lateral. Ripened head of fruit composed of very numerous narrowly obpyramidal nutlets which are densely pubescent below with long nearly erect hairs. Seed pendulous; endosperm thin; cotyledons linear. Only the genus *Platanus*, comprising some 7 species, natives of the north temperate zone.

Platanus acerifòlia Willd., LONDON PLANE, said to be of hybrid origin, is commonly planted for shade and ornament and becomes as large as any tree grown; its fruiting pendulous flower-cluster consists of 1, 2 or 3 globular dense heads; its sharply lobed leaves are 6′ or 8′ wide. It has been confused with *P. orientalis* L., which is supposed to be one of its parents and the American Plane the other.

Platanus occidentàlis L., AMERICAN PLANE, North American, is recorded by Reade, by H. B. Small, and by Lefroy as grown in Bermuda. Its fruiting flower-cluster consists of one globular head.

Family 7. **ROSÀCEAE** B. Juss.

ROSE FAMILY.

Herbs, shrubs, or trees, with alternate (in some few genera opposite) leaves, and regular perfect or rarely polygamo-dioecious flowers. Stipules commonly present, sometimes large. Calyx free from or adnate to the ovary, 5-lobed (rarely 4–9-lobed), often bracteolate. Disk adnate to the base of the calyx. Petals equal in number to the calyx-lobes, distinct, or none. Stamens usually numerous, distinct; anthers small, 2-celled. Carpels 1–∞, distinct, or adnate to the calyx. Ovary 1-celled or rarely imperfectly 2-celled; style terminal or lateral. Ovules 1, 2, or several, anatropous. Fruit mostly follicles or achenes; endosperm none, or rarely copious. About 75 genera and more than 1200 species, of wide geographic distribution.

Style lateral. 1. *Duchesnea*.
Style terminal. 2. *Potentilla*.

1. **DUCHÈSNEA** J. E. Smith.

Perennial herbs, with leafy runners, 3-foliolate long-petioled leaves and axillary slender-peduncled yellow perfect flowers. Calyx 5-parted, 5-bracteolate, the bractlets larger than the calyx-segments and alternating with them, dentate or incised. Petals 5, obovate. Stamens numerous. Pistils numerous, borne on a hemispheric receptacle which greatly enlarges but does not become pulpy in fruit. Achenes superficial on the receptacle. [In honor of A. N. Duchesne, French botanist.] Two species, natives of southern Asia, the following typical,



1. Duchesnea índica (Andr.) Focke. YELLOW OR INDIAN STRAWBERRY. (Fig. 186.) Silky-pubescent, tufted and forming leafy runners, dark green. Leaflets rhombic-obovate to ovate, crenate or dentate, obtuse at the apex; peduncles equalling or longer than the leaves; flowers ½′–¾′ broad; bractlets of the calyx dentate or incised, exceeding the ovate or lanceolate acuminate spreading calyx-lobes; fruit red, globose or ovoid, insipid, about ½′ in diameter. [*Fragaria indica* Andr.]

In grassy woods, Devonshire, 1905. Introduced. Native of India. Naturalized in the eastern United States and in Jamaica. Flowers from spring to autumn.

2. POTENTÍLLA L.

Herbs or shrubs, with alternate stipulate digitately or pinnately compound leaves, and cymose or solitary, yellow white or purple perfect flowers. Calyx persistent, its tube concave or hemispheric, 5-bracteolate (rarely 4-bracteolate), 5-lobed (rarely 4-lobed). Petals 5 or rarely 4, mostly obovate or orbicular, usually emarginate. Stamens 20–30, seldom 5 or 10; filaments slender; anthers small. Carpels usually in 3 series, numerous, inserted on a dry, usually pubescent receptacle; style terminal, deciduous. Seed pendulous and anatropous. [Diminutive of *potens*, powerful, from the medicinal properties of some species.] Over 300 species, nearly all natives of the north temperate zone, the following typical.

1. Potentilla réptans L. CREEPING CINQUEFOIL. (Fig. 187.) Perennial by a short rootstock; stems appressed-pubescent, decumbent or trailing, 3° long or less, or at first upright. Leaves digitately 5-foliolate, the basal and lower ones long-petioled; leaflets ¾′–2½′ long, oblanceolate, rounded at the apex, coarsely dentate, glabrous or nearly so above, silky beneath; stipules lanceolate, 5″–8″ long; peduncles axillary, solitary, 1-flowered, about 1½′ long; bractlets 2½″ long, about equalling the calyx-lobes; petals yellow, 2½″–3″ long.

Borders of marshes. Naturalized from Europe. Flowers from spring to autumn. Introduced into the eastern United States.



Fragaria virginiàna Duchesne, VIRGINIA STRAWBERRY, is recorded by Lefroy as having been found wild in Paget, probably escaped from gardens. Strawberry cultivation has, in recent years, reached a successful development, several races being grown, and large yields secured in seasons of abundant rainfall.

Spiraea cantoniénsis Lour., CHINESE SPIRAEA, Asiatic, commonly planted for ornament, is a shrub about 5° high, with thin glabrous rhombic-lanceolate serrate leaves 2½′ long or less, green above, pale beneath, the corymbose white, often double flowers about ½′ broad. [*S. Reevesiana* Lindl.]

Spiraea prunifòlia Sieb. & Zucc., PLUM-LEAVED SPIRAEA, also Asiatic, recorded by Lefroy and by Verrill as grown in gardens, is similar to the preceding species, but has ovate or oblong leaves pubescent beneath. [*S. japonica* of Jones?]

Spiraea salicifòlia L., MEADOW-SWEET, European, also recorded as a garden shrub by Jones, Lefroy and Verrill, has numerous pinkish flowers in dense terminal pubescent panicles.

Roses (genus **Rosa**) are grown in profusion and with great success in many kinds, but do not spread beyond cultivation to any considerable extent, although Lefroy records that a species doubtfully determined as *Rosa laevigata* Michx. was naturalized in Pembroke Marsh and in the Walsingham tract. The Green Rose is frequently seen in gardens.

Rosa bracteàta Wendl., Asiatic, an evergreen species with single white flowers and small entire leaflets, is commonly planted on walls.

Rubus ellípticus Smith, YELLOW RASPBERRY, Himalayan, a shrub with densely bristly-hairy stems and petioles, and armed with yellowish curved prickles, the canes nearly erect or arching and 10°–15° long, the leaves 3–5-foliolate with ovate to broadly elliptic irregularly serrate leaflets 1½′–4′ long, whitish-puberulent beneath, the white flowers about ½′ wide, numerous in small clusters; the yellow, edible fruit, 5″–6″ long, has been planted for its fruit; luxuriant plants were seen at Montrose in 1913.

Rubus triviàlis Michx., SOUTHERN DEWBERRY, of the southeastern United States, is a trailing vine with bristly-hairy and prickly slender branches 5° long or longer; the leaves have 3 or 5 glabrous, ovate, sharply serrate, short-stalked leaflets 1′–2½′ long; the white flowers, about 1′ broad, are usually solitary; the black, edible fruits are 6″–10″ long. It has been planted for its fruit, and was seen in a hedge at the Agricultural Station in 1913.

Rubus Idaèus L., EUROPEAN OR GARDEN RASPBERRY, a species with erect prickly canes 2°–5° high, large clusters of small white flowers, producing the well-known fruit, has been planted experimentally, but does not succeed well.

Rubus fruticòsus L., EUROPEAN BRAMBLE, is recorded by Reade as having been introduced but did not thrive.

LOGANBERRY, of hybrid origin, seen at Echo Heights in 1914, has long prickly stems, 3-foliolate leaves, the leaflets broadly ovate, dark green above, densely whitish-pubescent beneath; its dark red fruit is about 1′ long. The plants did not succeed.

Schizonotus Lindleyànus Wall. [*Sorbaria Lindleyana* Maxim.], LINDLEY'S SCHIZONOTUS, Himalayan, a shrub about 6° high, with pinnate leaves of 15–23 sessile, lanceolate, incised, acuminate leaflets and large terminal panicles of small white flowers, was grown at Wood Haven in 1914.

The record, by Lefroy, of *Geum radiatum?* Michx., North American, "a common yellow-flowering weed in fields," is manifestly an error for some other plant either in record or determination. H. B. Small also records it and compares it with "goat-weed" (*Capraria biflora*) from which he says it differs in having yellow flowers, but *Geum radiatum* does not resemble *Capraria*.

A double-flowered *Geum*, grown at Rose Cottage in 1914, flowered sparingly

Family 8. **MALÀCEAE** J. K. Small.

APPLE FAMILY.

Trees or shrubs, with alternate leaves, the small deciduous stipules free from the petiole. Flowers regular, perfect. Calyx superior, mostly 5-toothed or 5-lobed, its tube adnate to the ovary. Petals mostly 5, usually clawed. Stamens numerous or rarely few, distinct; anthers small, 2-celled; sacs longitudinally dehiscent. Ovary composed of 1 or of 2–5 wholly or partly united carpels; ovules 1–2 (rarely several) in each carpel, anatropous, ascending; styles 1–5; stigma small. Fruit a more or less fleshy pome, consisting of the thickened calyx-tube enclosing the bony papery or leathery carpels. Endosperm none; cotyledons fleshy. About 20 genera and probably not fewer than 500 species, of wide geographic distribution. No member of the family is native or naturalized.

Malus Màlus (L.) Britton, APPLE, European, is grown sparingly; the tree attains only a small size and the fruit is of poor quality, though available for cooking; one grown at Harrington Home bore leaves nearly throughout the year. [*Pyrus Malus* L.]

Cydonia Cydònia (L.) Karst., QUINCE, European, is grown sparingly, and with indifferent success, although producing some fruit. [*C. vulgaris* Pers.]

Pyrus commùnis L., PEAR, European, is sometimes grown but without much success; as shown at Mt. Langton the trees live for many years but do not fruit well nor abundantly. The leaves are deciduous; flowers were observed in December, 1912; the tree ordinarily flowers in spring.

Cotoneaster pyracántha (L.) Spach. [*Crataegus pyracantha* Pers.], EVERGREEN THORN, European, has been successfully grown. It is a spiny shrub, with small oblong shining leaves and corymbose white flowers.

Lefroy records the failure of his experiment in 1872 of growing a great number of species of THORN-TREES (*Crataegus*) from seeds received from the United States.

Cotoneaster frígida Wall., HIMALAYAN COTONEASTER, taken to Mt. Langton from the New York Botanical Garden in 1913, is a nearly evergreen shrub with oblong, entire leaves about 4′ long and many-flowered clusters of white flowers.

Cotoneaster microphýlla Wall., SMALL-LEAVED COTONEASTER, also Himalayan, and taken to Mt. Langton from the same source in 1913, is a low, much-branched shrub with cuneate-obovate leaves 10″ long or less, lustrous on the upper side, tomentose beneath, its small white flowers usually solitary.

Raphiolepis integérrima Hook. & Arn., ENTIRE-LEAVED RAPHIOLEPIS, Japanese, successfully grown at the Agricultural Station in 1913, is a shrub about 3° high, with thick, glabrous, evergreen, entire, petioled, obtuse, alternate leaves 2′–3′ long, dense, terminal panicles of white flowers 2′–4′ long, the oblong, blunt petals 4″–5″ long, the globose black fruits about 4″ in diameter.

Eriobotrya japònica (Thunb.) Lindl., LOQUAT, Japanese, grows luxuriantly and has been much planted for its edible fruit, which, however, is punctured by the fruit-fly, and no considerable quantity of good loquats are now produced. The Loquat is a small tree, attaining about 25° in maximum height, with thick, oblong, serrate leaves 4′–8′ long, narrowed at both ends, and brownish-woolly beneath, its white flowers in short dense woolly terminal panicles, the 5 petals crenulate; the fruit is a yellow, oval or pear-shaped acid pome about 1½′ long. [*Mespilus japonica* Thunb.]

Family 9. **AMYGDALÀCEAE** Reichb.

PLUM FAMILY.

Trees or shrubs, the bark exuding gum, the foliage, bark and seeds containing prussic acid, bitter. Leaves alternate, petioled, simple, the small stipules early deciduous, the teeth and petiole often glandular. Flowers regular, mostly perfect. Calyx inferior, deciduous, free from the ovary, 5-lobed. Disk annular. Calyx-lobes imbricated in the bud. Petals 5, inserted on the calyx. Stamens numerous, inserted with the petals. Pistil 1 in our genera; ovary 1-celled, 2-ovuled; style simple; stigma mostly small and capitate. Fruit a drupe. Seed 1, suspended; endosperm none; cotyledons fleshy. About 10 genera and 120 species, widely distributed, most abundant in the north temperate zone.

1. **LAUROCÉRASUS** [Tourn.] Reichenb.

Shrubs or trees pervaded with prussic acid. Leaves alternate, persistent; simple, entire or remotely toothed. Flowers perfect, in axillary racemes. Calyx white, its 5 lobes deciduous. Petals 5, white, deciduous. Stamens 15–30; filaments slender, distinct. Ovary sessile, 1-celled; style simple. Ovules 2, pendulous. Drupe subglobose or slightly elongated, with a dry exocarp, the stone turgid. Seed solitary. [Laurel Cherry.] About 20 species, natives of warm-temperate and tropical regions. Type species: *Laurocerasus Laurocerasus* (L.) Britton.

1. Laurocerasus caroliniàna (Mill.) Roem. CAROLINA LAUREL-CHERRY. (Fig. 188.) An evergreen tree, sometimes 40° tall, with a slender trunk rarely over 1° thick. Leaves leathery, narrowly elliptic to oblong-lanceolate, sometimes remotely toothed, acuminate at both ends or acute at the base, slightly revolute, lustrous above, dull beneath; petioles 2½″–4″ long; racemes shorter than the leaves, rather dense; pedicels club-shaped, subtended by early deciduous scarious acute bracts; calyx-lobes suborbicular, reflexed; petals boat-shaped, smaller than the sepals; drupes oblong or oval, 5″–7″ long, abruptly pointed, black, lustrous; stone ovoid.



A number of trees in Paget Marsh, 1905; many cut down by 1913, but numerous seedlings observed. Naturalized. Native of the southeastern United States. Flowers in winter and spring.

Lefroy records the failure of *Laurocerasus occidentalis* (Sw.) Roemer [*Prunus occidentalis* Sw.] and of *L. myrtifolia* (L.) Britton [*Prunus sphaerocarpa* Sw.], introduced from Trinidad in 1872.

Reade records the introduction of *Padus virginiana* (L.) Mill., AMERICAN WILD CHERRY, prior to 1883, but no wild cherry trees are now known in Bermuda.

Amygdalus pérsica L., PEACH, Asiatic, is widely planted in several races and grows luxuriantly, but the production of good fruit is almost completely prevented by the stinging of the fruit fly, and the industry is thus essentially prevented. NECTARINE, a variety of *Amygdalus persica,* was formerly in cultivation.

Amygdalus commùnis L., ALMOND, Asiatic, is occasionally grown, but its fruit also is stung. Lefroy records the BITTER ALMOND as in cultivation prior to 1875.

Prunus doméstica L., PLUM, European, has been experimented with but does not succeed, the climate being unsuitable. A species of *Prunus,* a kind of Plum, the species undetermined, was seen growing as the stock on which a peach tree had been grafted, at the Agricultural Station in 1914.

Prunus armeniàca L., APRICOT, Asiatic, grows luxuriantly, as shown by tree about 18° high seen at Mt. Hope in 1914; it is rarely planted. [*Armeniaca vulgaris* DC.]

Chrysobalanus pellocàrpus Meyer, PORK-FAT APPLE, West Indian, with evergreen obovate leaves, small white flowers in showy axillary and terminal panicles, and obovoid drupes with thin purplish flesh covering a large hard stone, is grown in a few gardens for preserves, and thrives luxuriantly.

Family 10. **MIMOSÀCEAE** Reichenb.

MIMOSA FAMILY.

Herbs, shrubs or trees, with alternate, commonly 2–3-pinnate leaves, the stipules various, and small regular mostly perfect flowers in heads, spikes or racemes. Calyx 3–6-toothed or 3–6-lobed, the teeth or lobes mostly valvate in the bud. Corolla of as many distinct or united petals, also valvate. Stamens distinct, or monadelphous. Ovary 1-celled; style simple. Fruit a legume. Seeds without endosperm; cotyledons fleshy. About 30 genera and 1350 species, mostly tropical.

Trees or shrubs; seeds transverse in the pod. 1. *Leucaena.*
Herbs; seeds oblique or lengthwise in the narrow pod. 2. *Acuan.*

1. **LEUCAÈNA** Benth.

Evergreen shrubs or trees, usually unarmed. Leaves alternate, pinnate; petioles often furnished with a gland, the leaflets subtended by setaceous stipels; leaflets oblique, small and in many pairs or large and in few pairs; flowers mostly perfect, sessile, white, in dense heads. Calyx 5-lobed. Corolla of 5 distinct petals. Stamens 10, exserted. Ovary stalked; style filiform; ovules numerous. Pods broadly linear, flat. Seeds crosswise in the pod. [Greek, referring to the white flowers.] About 15 species, natives of warm and tropical regions, the following typical.

1. Leucaena glaùca (L.) Benth. JUMBIE BEAN. WILD MIMOSA. ACACIA. (Fig. 189.) A small tree, sometimes 30° tall, with spreading branches and tomentose twigs. Leaves 4′–12′ long, with 6–20 pinnae; leaflets 20–40, narrowly oblong to lanceolate, 3″–6″ long, acute; peduncles tomentose; heads globose, about 10″ in diameter; calyx obconic, ½″ long; petals linear-oblong or linear-spatulate, erect, pubescent; stamens nearly thrice as long as the petals; pods 4′–6′ long, acute at both ends. [*Mimosa glauca* L.; *Acacia paniculata* of Jones and of Hemsley can only be this species.]

Common in neglected grounds. Naturalized from tropical America. Naturalized in the southern United States. Flowers nearly throughout the year. Locally a pestiferous weed. Its seeds, strung on thread, are made into necklaces.



2. **ÁCUAN** Medic.

Perennial herbs or shrubs, with bipinnate leaves, small stipules, and greenish or whitish small regular flowers in axillary peduncled heads or spikes. Flowers perfect, sessile, or the lowest sometimes staminate, neutral or apetalous. Calyx campanulate, its teeth short. Petals valvate, distinct, or slightly united or coherent below. Stamens 10 or 5, distinct, mainly exserted; anthers all alike. Ovary nearly sessile; ovules ∞. Pod linear, straight or curved, acute, flat, several-seeded, 2-valved, the valves coriaceous or membranous. About 10 species, natives of warm and tropical America, one widely distributed in tropical regions of the Old World, the following typical.



1. Acuan virgàtum (L.) Medic. VIRGATE MIMOSA. (Fig. 190.) Shrubby, sparingly loosely pubescent or glabrous, 2°–6° high, slender, branching. Leaves 2′–6′ long, short-petioled; pinnae 3 or 4 pairs; an oblong sessile gland just below the lowest pair; leaflets numerous, thin, narrowly oblong, sessile, obtuse, 6″ long or less, 1″–1½″ wide, the midvein near the upper margin; flower-heads globose, slender-peduncled; flowers about 1″ wide; stamens 10; pods 1½′–3′ long, about 2″ wide, pointed. [*Mimosa virgata* L.; *Desmanthus virgatus* Willd.; *Desmodium virgatum* of Lefroy.]

Abundant in fields between Castle Harbor and Harrington Sound, and along the South Shore Road in Devonshire. Recorded by Reade from Somerset Bridge. Native. Flowers from spring to summer. West Indies and tropical America. Its seeds probably transported to Bermuda by birds.

Mimosa púdica L., SENSITIVE PLANT, tropical American, a low shrub, its extremely sensitive leaves folding down when touched, its small purple flowers in heads, has been grown in gardens for interest.

Albizzia Lébbeck (L.) Benth., BLACK EBONY, of tropical Asia and Africa, naturalized in the West Indies, a large tree with smooth bipinnate leaves, numerous obliquely oblong leaflets 1′–2′ long, capitate yellow flowers with long stamens and very large thin flat several-seeded pods often 8′ long and nearly 2′ wide, shining when old, is frequently planted for shade and ornament. [*Mimosa Lebbeck* L.]

Acacia aràbica (Lam.) Willd., YELLOW MIMOSA, erroneously called Gum Arabic, a spiny tree with many globular heads of small yellow flowers, followed by flat moniliform elongated pods, has been formerly planted for ornament, but no tree has been seen by us in Bermuda. [*Mimosa arabica* Lam.]

Acacia macracántha H. & B., West Indian, is recorded by Lefroy as spontaneous from seeds in soil from the West Indies in 1874, and became a flourishing tree; H. B. Small records its existence there at the time of his writing, but I did not see it.

Acacia dealbàta Link, SILVER WATTLE, Australian, seen at Wood Haven in 1914 as a young plant 5° high, becomes, in Australia, a large tree; it has pubescent, bipinnate leaves of very many minute leaflets.

Another *Acacia*, growing at Wood Haven the same year, has crowded ovate leaves only 3″–4″ long, obtuse and nearly sessile.

Inga Ìnga (L.) Britton, record of which is made by Lefroy of failure to grow is a forest tree of the West Indies with simply equally pinnate, pubescent leaves, the leaflets large, the flowers capitate, the narrowly linear pod 4-ribbed; the tree is also recorded as Bermudian by Jones. [*Inga vera* Willd.; *Mimosa Inga* L.]

Pithecolobium Unguis-cáti (L.) Mart., CAT'S-CLAW, West Indian, a small densely branched tree, its leaves each with two pairs of thin blunt obovate veiny leaflets, small flowers in racemed heads, and coiled pods, is occasional in parks and gardens. [*Mimosa Unguis-cati* L.]

Enterolobium Sáman (Jacq.) Prain, GUANGO, RAIN-TREE, ALGARROBA, of tropical America, is a large tree, with bipinnate leaves 1° long or more, the numerous, blunt, obovate leaflets 6″–8″ long, glabrous above, pubescent beneath, a small round gland on the rachis between each pair of pinnae; the small, dense umbels of flowers are borne on long pubescent peduncles, short-pedicelled, the calyx pubescent, 3″ long, the silky-villous corolla 5″–6″ long, the pinkish stamens nearly 2′ long; the pod is linear, 4′–8′ long, tardily dehiscent. The tree is occasionally planted. A specimen at Radnor had a trunk circumference of 5° 8′ in 1914. [*Mimosa Saman* Jacq.; *Pithecolobium Saman* Jacq.]

Vachellia Farnesiàna (L.) W. & A., AROMA, Tropical American, a shrub, or small tree, with stipular spines, bipinnate, somewhat pubescent leaves with many leaflets 2″–3″ long, globose, peduncled heads of many small yellow flowers with exserted stamens, and woody somewhat compressed pods 2′–4′ long, is occasionally planted for ornament. [*Acacia Farnesiana* L.]

Prosopis juliflòra (Sw.) DC., MESQUITE, West Indian, was represented by young plants in the collection at the Agricultural Station in 1914. It forms a tree, up to 40° high, with bipinnate leaves, the leaflets small, oblong and blunt, the very small yellowish flowers in long spikes, the curved, linear pods 8′ long or less. [*Mimosa juliflora* Sw.]

Seeds of *Entada*, West Indian, are often washed ashore, but none are known to have ever germinated; they are borne in enormous pods on high-climbing woody vines, which grow along rivers.

Family 11. **CAESALPINIÀCEAE** Kl. & Gareke.

SENNA FAMILY.

Trees, herbs or shrubs, with alternate simple or compound mostly stipulate leaves. Flowers mostly clustered and perfect, sometimes monoecious, dioecious or polygamous, nearly regular, or irregular. Calyx mostly of 5 sepals or 5-toothed. Petals usually 5, imbricated, and the upper (unpaired) one enclosed by the lateral ones in the bud. Stamens 10 or fewer in our genera, the filaments distinct, or more or less united. Ovary 1-celled, 1–many-ovuled. Fruit a legume, mostly dehiscent into 2 valves. Seeds with or without endosperm. About 90 genera and 1000 species, mostly of tropical distribution.

Leaves pinnate; plants not prickly. 1. *Cassia.*
Prickly vines with bipinnate leaves. 2. *Guilandina.*

1. **CÁSSIA** [Tourn.] L.

Herbs, shrubs, or some tropical species trees, with evenly pinnate leaves, and mainly (in our species) yellow flowers. Calyx-teeth nearly equal, generally longer than the tube. Corolla nearly regular; petals 5, spreading, nearly equal, imbricated, clawed. Stamens usually 10, sometimes 5, often unequal and some of them imperfect; anthers all alike, or those of the lower stamens larger, opening by 2 pores at the summit. Ovules ∞. Pod often curved. Seeds numerous. [Ancient name.] About 200 species, of wide distribution in warm and temperate regions. Type species: ***Cassia Fistula*** **L.**

Herbaceous perennial; pods flat; leaflets lanceolate, acute. 1. *C. ligustrina.*
Partly climbing shrub; pods swollen; leaflets oval or obovate, obtuse. 2. *C. bicapsularis.*
Annual; pods flat; leaflets ovate. 3. *C. occidentalis.*

1. Cassia ligustrina L. PRIVET SENNA. (Fig. 191.) Perennial, 3°–6° tall, herbaceous, glabrous. Stem grooved; leaflets 12–16, lanceolate, acute, 1′–2½′ long, about 1′ wide; petiolar gland at base of rachis, elongated, stipitate; stipules linear, caducous; racemes few-flowered, forming a panicle; pods flat, glabrous, somewhat curved, 3′–5′ long, 4″ wide; seeds parallel with the valves, oblong, about 2″ long.

Escaped from gardens to roadsides. Introduced from tropical America, or the southeastern United States. Flowers in autumn and early winter. Abundant in the West Indies.





2. Cassia bicapsulàris L. CHRISTMAS BUSH. (Fig. 192.) Shrubby, 4°–10° high, glabrous. Leaflets 4–8, obovate to oval, obtuse and rounded at the apex, 5″–10″ long, very short-stalked; gland oblong to subglobose, short-stipitate, borne above the lower pair of leaflets; racemes few-flowered, axillary, scarcely longer than the leaves; flowers about 10″ wide; pods linear-cylindric, 3′–5′ long, about 5″ thick, blunt or short-pointed.

Frequent along roadsides and in hedges. Naturalized from tropical America. Flowers from spring until winter. It is commonly planted for ornament, and grows luxuriantly.

3. Cassia occidentàlis L. COFFEE SENNA. (Fig. 193.) A glabrous annual herb, 3°–6° high. Stipules caducous; gland round, borne near the base of the petiole; leaflets 8–12, rounded at the base, 1′–2′ long, 5″–12″ wide; flowers 7″–10″ broad, in short axillary racemes; stamens 10, the upper 3 imperfect; calyx-lobes oblong, obtuse; pod linear, glabrous, 4′–6′ long, about 3″ wide, somewhat curved, its margins thickened.

Occasional in cultivated grounds, St. Georges. Naturalized. Native of the southern United States and tropical America. Flowers in autumn.



Cassia bacillàris L., CLIMBING CASSIA, West Indian, a half-climbing shrub, the leaves with only two pairs of broad leaflets, the pod cylindric, the large panicled flowers bright yellow, is occasionally cultivated for ornament.

Cassia alàta L., WINGED CASSIA, of the Old and New World tropics, a shrub with very large leaves of 12–20 oblong leaflets, the pod 4-winged, is mentioned by Reade as planted.

Cassia glaùca Lam., WEST INDIAN ASH, is recorded by Lefroy as grown at Somerville and Par-la-Ville, but did not exist at either place in 1914; it is also mentioned by Jones, by Reade, and by Verrill. It is a tree with pinnate leaves with 4–6 pairs of oval leaflets glaucous beneath, the large flowers yellow, the pod linear.

Cassia Fístula L., PUDDING PIPE TREE, East Indian, a tree 50° high or higher, with large pinnate leaves of 8–12 ovate-lanceolate leaflets 6′–8′ long, drooping racemes of golden yellow flowers 1½′–2′ wide, and round smooth black pods often 2° long, is occasionally planted for shade and ornament.

Cassia grándis L.f., GREAT CASSIA, of tropical America, is a large tree with pubescent, pinnate leaves of 10–20 pairs of oblong, obtuse or apiculate leaflets about 2′ long; its reddish or pinkish yellow flowers are in drooping racemes, the long, somewhat flattened pod transversely wrinkled. A young tree, showing foliage only, tentatively referred to this species, grew at Paget Rectory in 1914.

Cassia siamèa Lam., MANY-FLOWERED CASSIA, East Indian, is mentioned by Reade as growing in the Public Grounds prior to 1883, and was seen at the Agricultural Station in 1914. It is a tree up to 50° high, the glabrous pinnate leaves with about 6 pairs of oval-oblong leaflets, the numerous yellow flowers panicled, the pod linear, coriaceous, drooping, 4′–8′ long. [*C. florida* Vahl.] H. B. Small states that the tree mentioned by Reade was an *Albizzia*.

Cassia corymbòsa Lam., CORYMBOSE CASSIA, South American, recorded by Lefroy as introduced at Mt. Langton prior to 1877, but not found there at present, is a tree with glabrous leaves of 3 pairs of oblong-lanceolate leaflets, about 2′ long, the yellow corymbose, showy flowers about 1′ broad, the pods cylindric.

2. GUILANDÌNA L.

Shrubs, or woody vines, with stout but weak stems, armed with recurved prickles. Leaves abruptly bipinnate, with several pinnae. Leaflets 10–16 to each pinna, pellucid-punctate. Flowers in racemes or panicles; bracts narrow, deciduous. Calyx-lobes 5, imbricated, longer than the tube. Petals 5, yellow, nearly equal. Stamens 10; filaments pubescent near the base; anthers opening lengthwise. Pods little longer than broad, flattened, prickle-armed, 2-valved, 1–few-seeded. Seeds slightly flattened. [In honor of Melchior Guilandinus, traveller and botanist, died 1590.] Ten species, or more, natives of tropical and subtropical America. Type species: *Guilandina Bonduc* L.

1. Guilandina Crísta (L.) Small. GREY NICKERS. BRIER-BUSH. (Fig. 194.) A straggling shrub, armed with hooked prickles, the foliage finely pubescent. Leaves 1°–2° long, the leaflets numerous, ovate to oblong-ovate or nearly oblong, mucronulate, 1½′–3½′ long, rounded, truncate or subcordate at the base; stipules mostly foliaceous; racemes or panicles 4′–15′ long; bracts surpassing the pedicels, recurved; corolla dull yellow, 5″–7″ broad; pods oval or oval-oblong, 2′–3′ long, prickly all over, obliquely short-beaked; seeds gray or lead-colored. [*Caesalpinia Crista* L.; *G. Bonducella* L.]



Rocky woodlands between Castle Harbor and Harrington Sound and on walls and in thickets, Smith's Parish, and in Paget and Warwick. Native. South Florida and West Indies. Flowers nearly all the year around. Its seeds presumably brought to Bermuda through the ocean, as it is an abundant coastal species in the Bahamas. In the West Indies this plant is characteristically halophytic but we have not observed it growing anywhere on the coast of Bermuda.

Ceratonia siliqua L., ST. JOHN'S BREAD, CAROB TREE, from the Levant, a low widely spreading tree with evergreen evenly pinnate leaves, small apetalous flowers and linear fleshy pods, has long been well established here. There is a fine group at Par-la-Ville.

Gleditsia aquática Marsh [*G. monosperma* Walt.], SWAMP LOCUST, North American, a large very thorny tree with bipinnate leaves of many oval to lanceolate leaflets, small spicate greenish flowers, the 1-seeded or 2-seeded oval oblique pods about 2′ long, is recorded by Reade as grown near Spanish Point prior to 1883, and also mentioned by H. B. Small.

Gleditsia tricánthos L., HONEY OR SWEET LOCUST, also North American, with foliage and flowers similar to the preceding species, but the thin pods 1°–1½° long, 1′–1½′ wide, the upper margin crenate, grew in a Smith's Parish Garden in 1913.

Delonix règia (Bojer) Raf. [*Poinciana regia* Bojer], ROYAL POINCIANA, FLAMBOYANT, from Madagascar, one of the most elegant of all trees, is extensively planted for shade and ornament and grows luxuriantly, attaining a height of 40° or more, with widely spreading branches and dark green bipinnate leaves 1°–1½° long, composed of many oblong leaflets. Its crimson flowers are about 3′ wide, borne in large axillary racemes and are abundantly produced in the autumn, succeeded by long pendulous woody pods, up to 18′ long and 2′ wide, containing several or many seeds.

Parkinsonia aculeàta L., PARKINSONIA, tropical American, a small tree, sometimes prickly, with elongated bipinnate leaves of 1 or 2 pairs of narrow pinnae bearing many oblong obtuse leaflets ½′–2′ long, the large yellow flowers racemose, the long, linear, 2-valved pod constricted between the seeds, is occasionally planted for ornament.

Cercis Siliquástrum L., JUDAS TREE, of southern Europe and western Asia, was shown as a young plant at Wood Haven in 1914. It becomes, under favorable conditions, a tree up to about 40° high; its thin, orbicular, rounded, cordate, glabrous leaves are slender-petioled, 2½′–4′ broad, its purplish flowers about 8″ long, borne in lateral clusters on the twigs on slender pedicels.

Libidibia coriària (Jacq.) Schlecht., DIVI-DIVI, of tropical America, shown in 1914 by a fine old tree about 30° high with widely spreading branches, has bipinnate leaves of several pairs of pinnae, each with numerous pairs of linear leaflets about 4″ long, black-dotted beneath; the flowers are white, in compound racemes, the spatulate petals about 2″ long, the fleshy, laterally incurved, glabrous pod about 1½′ long. [*Poinciana coriaria* Jacq.]

Poinciana pulchérrima L. [*Caesalpinia pulcherrima* Sw.], BARBADOES PRIDE, a prickly shrub, sometimes 10° high, with bipinnate leaves, of many small, thin, oval leaflets, the orange or yellow flowers about 2′ wide, long-pedicelled in loose racemes or panicles, with long-exserted stamens, the thin pods 4′ long or less, is planted for ornament; it is widely distributed through cultivation in tropical regions, its original home unknown.

Caesalpinia elàta Sw., Indian, is said by Lefroy to have been raised from seed brought from Turk's Island in 1872, and flowered the third year; it is an unarmed tree, with bipinnate leaves and racemose flowers, the petals crisped, the filaments red.

Caesalpinia Gillièsii Wall., South American, a climbing or straggling shrub, with bipinnate leaves, the numerous small oblong leaflets black-punctate, the inflorescence densely glandular, the large yellow flowers with long exserted stamens, is grown in gardens for ornament and interest.

Tamarindus índica L., TAMARIND, probably native of tropical Africa, although its home is not certainly known, is commonly planted and grows luxuriantly, the tree becoming 50° high or more. Its leaves are pinnate, with about 30 oblong leaflets, slightly sour to the taste; its 3-petaled rather small flowers are racemose, the petals yellow with reddish veins; its pods about 3′ long, round, fleshy and very sour, are used for preserves.

Hymenaea Courbàril L., West Indian Locust, tropical American, a large tree with leaves of one pair of thick leaflets and oblong woody pods 6′–8′ long, has been occasionally planted as an ornamental lawn tree, but I do not know of any in Bermuda now.

Bauhinia monándra Kurz, Napoleon's Plume, East Indian, a shrub or tree with large round leaves cleft from the apex to about the middle and large irregular flowers, with only 1 fertile stamen, followed by half-woody pods 6′–8′ long, is frequently planted for ornament. This is probably the plant recorded by Lefroy and by Verrill as *Bauhinia Vahlii,* and, perhaps, not different from what Lefroy recorded as *Casparea porrecta.*

Bauhinia racemòsa Lam., Yellow Bauhinia, East Indian, a small tree, with leathery, 2-cleft leaves 1′–2′ long, yellow flowers with 10 stamens, its pods nearly 1° long, 1′ wide, is recorded by Lefroy as represented prior to 1877 by a tree at the Model Farm in Smith's Parish, flowering in June. [*B. parviflora* Vahl.]

Haematoxylon campechiànum L., Logwood, tropical American, a small tree with grooved or furrowed trunk, smooth bark, equally pinnate leaves 3′–6′ long with 3 or 4 pairs of obovate, emarginate leaflets 6″–8″ long, the axillary, racemose flowers yellow, was seen at the Agricultural Station in 1914.

Brownea grándiceps Jacq., Rosa de Monte, South American, noted by Lefroy as introduced at Mount Langton in 1875, is mentioned by H. B. Small as having subsequently disappeared. It is a large, pinnate-leaved tree, with showy, crimson, clustered flowers. [*Hermesias grandiceps* (Jacq.) Kuntze.]

Detàrium senegalénse Gmel., Detarium, of tropical Africa, listed by Jones in 1873 as growing in Bermuda, is not recorded by other authors and has not been observed by me. It has alternate, unevenly pinnate leaves of blunt ovate leaflets which are velvety beneath, its flowers in axillary racemes, with a 4-cleft calyx, no petals and 10 stamens, its fruit drupaceous.

Family 12. **FABÀCEAE** Reichenb.

Pea Family.

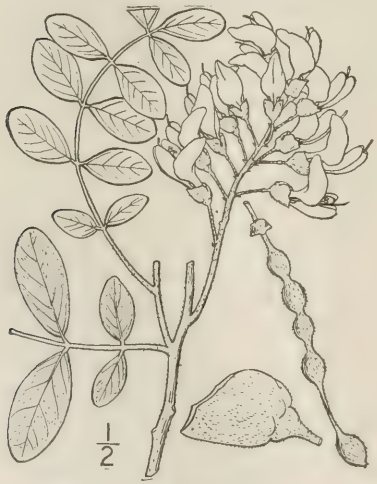
Herbs, shrubs, vines or trees, with alternate mostly compound stipulate leaves, and irregular (papilionaceous) perfect or sometimes polygamo-dioecious flowers, mainly in spikes, heads, racemes or panicles. Calyx 4–5-toothed, or 4–5-cleft, sometimes 2-lipped. Petals more or less united, or separate, perigynous or hypogynous, usually consisting of a broad upper one (standard, banner), two lateral ones (wings), and two front ones more or less united (forming the keel); the standard encloses the wings in the bud. Stamens monadelphous, diadelphous, or sometimes separate, 10 in most of the genera, sometimes 9, rarely 5. Pistil simple, superior; ovary mainly 1-celled, sometimes 2-celled by the intrusion of the sutures, or several-celled by cross-partitions; style simple; ovules 1–many, anatropous or amphitropous. Fruit a legume, 1–many-seeded, dehiscent into 2 valves, or indehiscent, in one tribe a loment. Seeds mostly without endosperm; cotyledons thick. About 325 genera and over 5000 species, most abundant in temperate and warm regions. The family is also known as Papilionaceae.

Filaments 10, all separate. 1. *Sophora.*
Filaments 10 or 9, monadelphous or diadelphous.
Leaves without tendrils.
Herbs, shrubs or trees.
Anthers of 2 kinds; stamens monadelphous. 2. *Cro[illegible]*
Anthers all alike; stamens mostly diadelphous.
Leaves 3-foliolate; herbs
Pods curved or curled. 3. *[illegible]*

Pods straight.
Flowers in long narrow racemes; pods coriaceous. 4. *Melilotus.*
Flowers capitate, umbellate or short-racemose; pods membranous. 5. *Trifolium.*
Leaves pinnate. 6. *Indigofera.*
Vines (*Cajan* an erect shrub); leaves 3-foliolate.
Inflorescence simply racemose; shrub. 7. *Cajan.*
Inflorescence nodose-racemose; vines.
Keel spirally coiled. 8. *Phaseolus.*
Keel merely curved.
Style bearded along the inner side.
Stigma oblique or lateral. 9. *Vigna.*
Stigma small, terminal. 10. *Dolichos.*
Style glabrous. 11. *Canavali.*
Leaves pinnate with a terminal tendril or tip. 12. *Vicia.*

1. SOPHÒRA L.

Leaves odd-pinnate. Flowers white, yellow or violet, in terminal racemes or panicles. Calyx generally campanulate, its teeth short. Standard obovate or orbicular; wings obliquely oblong; keel oblong, nearly straight. Stamens all distinct or very nearly so; anthers versatile. Ovary short-stalked; style incurved. Pod stalked, coriaceous or fleshy, terete, constricted between the seeds, mainly indehiscent. [Name Arabic, yellow.] About 25 species, natives of warm and tropical regions. Type species: *Sophora alopecuroides* L.



1. Sophora tomentòsa L. COAST SOPHORA. (Fig. 195.) A shrub 3°–9° tall, with tomentose foliage. Leaves 4′–8′ long; leaflets 11–17, the blades leathery, oblong, oblong-obovate or oval, inequilateral, becoming glabrous and revolute; racemes elongating, 4′–16′ long; pedicels 2″–5″ long; calyx oblong or oblong-funnelform, 3″–4″ long, constricted at the base, the edge undulate or indistinctly 5-lobed; corolla yellow; standard with an ovate blade fully 5″ broad, and over 6″ long; keel-petals 10″ long; pods 2′–4′ long, strongly constricted between the seeds, long-stalked.

Local on coastal rocks, Smith's Island, St. David's Island, southern shores and Boaz Island. Native. Coasts of Florida and the West Indies. Flowers from summer to spring. Doubtless transported to Bermuda by floating.

Lefroy records failure in establishing *Sophora chinènsis* G. Don.

2. CROTALÀRIA L.

Herbs, sometimes slightly woody, with simple (or in some tropical species 3–7-foliolate) leaves and racemose mostly yellow flowers. Calyx 5-toothed, slightly 2-lipped; standard orbicular or ovate, often cordate; wings oblong or obovate; keel curved. Stamens monadelphous, their sheath deeply cleft; anthers of 2 forms, alternating with each other, the one small, versatile, the other larger; style more or less curved; pod oblong or globose, inflated, many-seeded, the seeds loose at maturity. [Greek, a rattle.] About 250 species, mainly of tropical regions. Type species: *Crotalaria lotifolia* L.

1. Crotalaria retùsa L. RATTLE-BOX. (Fig. 196.) Annual, stout. Stems 1°–3° high, usually branched, finely and softly pubescent; leaflet one, ranging from cuneate to oblanceolate, 1½′–2½′ long, rounded or retuse at the apex, often glabrous above, more or less pubescent beneath, short-petioled; stipules minute; racemes conspicuous, several–many-flowered; pedicels 3″–5″ long, subtended by minute caducous bracts; calyx finely pubescent; lobes of the upper lip triangular-lanceolate, those of the lower lip lanceolate; corolla large, showy; standard with a blade usually about 10″ broad; pods 1½′–2′ long; seeds becoming loose in the pods and rattling when dry.



In a pasture, Walsingham, 1912. Adventive. Native of Florida, the West Indies and continental tropical America. Flowers in autumn and winter.

3. MEDICÀGO [Tourn.] L.

Herbs, with 3-foliolate leaves, and small yellow or violet flowers in axillary heads or racemes. Leaflets commonly dentate, the veins terminating in the teeth. Calyx-teeth short, nearly equal; standard obovate or oblong; wings oblong; keel obtuse; stamens diadelphous, the 1 opposite the standard separate from the other 9; anthers all alike; ovary 1–several-ovuled; style subulate; pod curved or spirally twisted, reticulated or spiny, indehiscent, 1–few-seeded. [Greek, Medike, from Medea, whence the Medic, or Lucerne, was derived.] About 50 species, natives of Europe, Asia and Africa. Type species: *Medicago sativa* L.



Pod 1-seeded, curved, not spiny.
1. *M. lupulina.*
Pod several-seeded, spirally twisted, its edges spiny. 2. *M. hispida.*

1. Medicago lupulina L. BLACK OR HOP MEDIC. BLACKSEED HOP CLOVER. NONESUCH. (Fig. 197.) Pubescent, the branches decumbent and spreading, often 1°–2° long; leaflets obovate, oval or nearly orbicular, 3″–7″ long, denticulate or crenulate, obtuse, mucronate or emarginate; stipules ovate or lanceolate, dentate; peduncles 1′–3′ long; head oblong, or cylindric, dense, 2″–10″ long; flowers about 1″ long, yellow; pods black when ripe, curved, strongly veined.

Common in fields and waste grounds. Naturalized from Europe. Widely naturalized in North America. Flowers nearly all the year around. Known as "Clover."



2. Medicago hìspida Willd. TOOTHED MEDIC. (Fig. 198.) Branches spreading or ascending, glabrous or with a few appressed hairs. Leaflets obovate, rounded, emarginate or obcordate, cuneate, crenulate, 5″–10″ long; stipules dentate; flowers few, yellow, in small, peduncled heads; pod spirally twisted, the 2 or 3 coils flat and rather loose, reticulated with elevated veins, the edges armed with 1 or 2 rows of curved prickles. [*M. denticulata* Willd.; *M. muricata* of Lefroy.]

Common in fields and waste grounds. Naturalized from Europe. Naturalized in the United States. Flowers from winter to autumn.

Medicago sativa L., ALFALFA, of Europe and Asia, with conspicuous violet flowers, is recorded as formerly occasional in waste grounds, but not persistent. It is occasionally cultivated. A plot was given to it at the Agricultural Station in 1914.

Medicago arábica All. [*M. maculata* With.], SPOTTED MEDIC, European, with dark-spotted leaflets, the edges of the coiled pods furrowed, recorded by Lefroy as Bermudian, has not been found by subsequent collectors. It is an annual, much resembling *M. hispida,* for which it may have been mistaken.

4. MELILÒTUS [Tourn.] Mill.

Herbs, with 3-foliolate leaves, dentate leaflets, their veins commonly ending in the teeth, and small white or yellow flowers in slender racemes. Calyx-teeth short, nearly equal; standard obovate or oblong; keel obtuse; ovary sessile or stipitate, few-ovuled; style filiform; pod ovoid or globose, straight, indehiscent or finally 2-valved; seeds solitary or few. [Greek, Honey-lotus.] About 20 species, natives of Europe, Africa and Asia. Type species: *Trifolium Melilotus officinalis* L. The plants are fragrant in drying, whence the English name Sweet-clover.

1. Melilotus indica (L.) All. (SMALLER YELLOW MELILOT. Fig. 199.) Foliage minutely pubescent when young. Stems erect or spreading, 3° high or less, sometimes copiously branched; leaflets 3, oblong, oval, cuneate or obovate, 3″–10″ long, retuse to rounded at the apex, serrate; racemes dense, 5″–10″ long; calyx campanulate; corolla yellow, about 1½″ long; pods oval or subglobose, 1″ long, wrinkled. [*M. officinalis* of Jones, Reade, Lefroy, Hemsley and Moore; *M. parviflora* Desv.; *Trifolium Melilotus indica* L.]

Common in waste and cultivated grounds. Naturalized from Europe. Naturalized in the western and southern United States. Flowers nearly all the year around, most abundantly in spring. It is often an abundant weed in neglected fields.



Melilotus alba Desv., WHITE MELILOT, European, with larger white flowers, recorded as Bermudian by Lefroy, has not been found by other collectors and evidently did not persist.

5. TRIFOLIUM [Tourn.] L.

Herbs, with mostly 3-foliolate (occasionally 4–11-foliolate) denticulate leaves, the flowers in dense heads or spikes. Stipules adnate to the petiole. Calyx-teeth nearly equal. Petals commonly persistent, their claws adnate to the stamen-tube. Stamens diadelphous, or the tenth one separate for only a portion of its length. Ovary few-ovuled. Pod often included in the calyx, membranous, indehiscent or tardily dehiscent by 1 suture, 1–6-seeded. [Latin, referring to the 3 leaflets.] About 275 species, most abundant in the north temperate zone, where several of them are important forage plants. Type species: *Trifolium pratense* L.

Flowers sessile or nearly so, the heads densely flowered. 1 *T. pratense*
Flowers distinctly pedicelled.
  Ascending or procumbent. 2 *T. hybridum*
  Creeping. 3 *T. repens*



1. Trifolium praténse L. RED, PURPLE OR MEADOW CLOVER. (Fig. 200.) Perennial, pubescent, 6′–2° high. Leaves long-petioled; stipules ovate, strongly veined, subulate-tipped, 6″–10″ long; leaflets short-stalked, oval, oblong or obovate, narrowed at base, hardly cuneate, obtuse and sometimes emarginate at the apex, often dark-spotted near the middle, finely denticulate, ½′–1½′ long; heads globose or ovoid, rarely slightly peduncled, about 1′ long; flowers red (rarely white), about 6″ long, remaining erect in fruit; calyx sparingly hairy, its subulate teeth shorter than the corolla.

Occasional in grassy places. Introduced. Native of Europe. Widely naturalized in North America. Flowers nearly all the year around. Experimental cultivation of clover for fodder has not been successful.

2. Trifolium hýbridum L. ALSIKE OR ALSATIAN CLOVER. (Fig. 201.) Perennial, 1°–2° high, glabrous or nearly so. Leaves long-petioled; stipules ovate-lanceolate, acuminate, membranous, 6″–12″ long; leaflets short-stalked, obovate, sometimes emarginate but not obcordate, narrowed or cuneate at the base, serrulate, 6″–12″ long; heads long-peduncled; flowers pink or nearly white, 2½″–4½″ long; pedicels 1″–2½″ long, reflexed when old; corolla 3–4 times as long as the calyx; calyx-teeth subulate, about equalling the tube; pod 2–4-seeded.

In grassy woods, Devonshire, 1905. Also reported by Moore. Native of Europe. Naturalized in North America. Flowers from spring to autumn.



3. Trifolium rèpens L. White, Dutch or Honeysuckle Clover. (Fig. 202.) Perennial, glabrous or with a few scattered hairs, the branches often rooting at the nodes, 4′–12′ long. Leaves long-petioled; stipules ovate-lanceolate, membranous, acute, 2″–6″ long; leaflets short-stalked, obovate, emarginate or obcordate, broadly cuneate at the base, denticulate, 4″–10″ long; heads long-peduncled; flowers 3½″–6″ long; pedicels 1″–2½″ long, finally reflexed; corolla 2–3 times as long as the calyx; calyx-teeth acuminate, somewhat shorter than the tube; pod about 4-seeded.

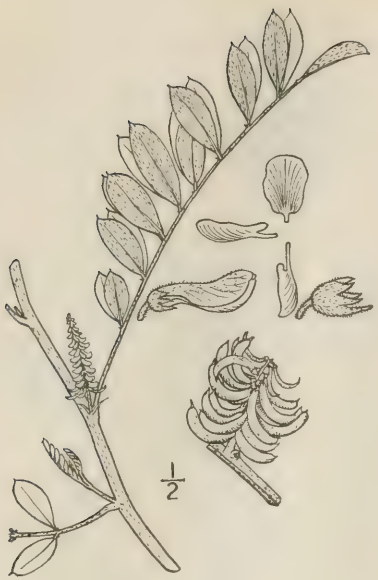


Occasional in grassy places. Introduced. Native of Europe. Widely naturalized in North America. Flowers nearly all the year around. None of the true clovers are important as fodder plants in Bermuda, the climate being too warm for their successful establishment.

6. INDIGÒFERA L.

Perennial herbs or shrubs. Foliage often more or less densely clothed with simple 2-horned or forking hairs. Leaves alternate, unequally pinnate, or sometimes 3-foliolate or rarely 1-foliolate; the leaflets entire. Flowers perfect, in axillary spikes or racemes. Calyx-lobes oblique, nearly equal or the upper shorter. Corolla pink, orange or purple; standard broad, sessile or clawed, persistent, the wings somewhat elongated, slightly cohering with the erect keel and like it deciduous. Stamens 10, usually monadelphous, or one partially distinct; anthers all alike. Ovary sessile or nearly so; style glabrous; ovules numerous or rarely few or solitary. Pod linear to subglobose, angled or turgid. Seeds subglobose or flattened. [Name from the yield of indigo by some species.] About 275 species, of warm and temperate regions.

The species common in Bermuda has been mistaken for the true indigo (*Indigofera tinctoria* L.) which is similar to it, but has narrower and longer pods. Formerly important dye-plants, their use has now been largely superseded through the production of dyes from coal-tar synthetically.



1. Indigofera suffruticòsa Mill. WILD INDIGO. (Fig. 203.) Foliage strigillose. Stems woody, erect, 3°–6° tall, angular, sparingly branched; leaflets 7–15, thin, oblong, oblanceolate or obovate, ½′–1½′ long, mucronate, acute at the base, glabrous or glabrate above; racemes shorter than the subtending leaves; pedicels about ½″ long, finally recurved; calyx densely pubescent, its lobes about as long as the tube; corolla orange, about 2″ long; pods stout, 6″–8″ long, curved, thickened at the sutures. [*I. Anil* L.; *I. tinctoria* of Jones, of Lefroy, and of H. B. Small.]

Frequent in waste grounds, especially plenty between Castle Harbor and Harrington Sound. Said by Lefroy to have been introduced for commercial purposes in the seventeenth century. Naturalized. Native of the West Indies. Naturalized in the southern United States. Flowers in summer and autumn.

7. CÁJAN Adans.

A perennial, stiff, slightly woody herb, finely puberulent, or pubescent, with pinnately 3-foliolate leaves, and showy yellow flowers in stalked axillary racemes. Calyx narrowly campanulate, its lobes acute, the 2 upper ones partly united. Standard nearly orbicular, reflexed; wings obliquely obovate; keel with a blunt incurved tip. Ovary many-ovuled; style thickened above; stigma oblique. Pod linear, flattened, acute and long-tipped, its valves impressed between the seeds. [From the Malayan name.] A monotypic genus.



1. Cajan Cájan (L.) Millsp. PIGEON PEA. (Fig. 204.) Bushy, branched, 6° high or less. Leaves petioled; leaflets oblong or oblong-lanceolate, 1′–3′ long, acute at both ends or obtuse at the base, velvety on both sides, dark green above, pale beneath; racemes few-flowered, as long as the leaves or longer; pedicels, rachis and calyx brown-pubescent; flowers 6″–8″ broad; pods 2′–3′ long, 5″–6″ wide, 4–7-seeded; seeds whitish, somewhat flattened, about 2″ thick. [*Cytisus Cajan* L.; *Cajanus indicus* Spreng.]

Spontaneous after cultivation for its edible seeds. Native of the East Indies. Widely cultivated and naturalized in tropical regions.

8. **PHASÈOLUS** [Tourn.] L.

Vines, rarely erect herbs, with pinnately 3-foliolate leaves, and axillary racemose flowers. Calyx 5-toothed or 5-lobed, or the 2 upper teeth more or less united. Standard orbicular, recurved, spreading or somewhat contorted; wings mainly obovate; keel spirally coiled, linear or obovoid. Stamens diadelphous (9 and 1). Style longitudinally bearded; stigma oblique or lateral; ovary sessile or nearly so; ovules ∞. Pod linear, 2-valved, several-seeded, tipped with the persistent style. Seeds mostly with rounded ends. Rachis thickened at the bases of the pedicels. [Ancient name of the Kidney Bean.] About 170 species, of warm and temperate regions. Type species: *Phaseolus vulgaris* L.



1. Phaseolus lignòsus Britton. WILD BERMUDA BEAN. (Fig. 205.) Perennial, with woody stems 20° long or more and ¼′ thick, branched, the young twigs puberulent, some becoming glabrous. Stipules ovate, or ovate-lanceolate, 2″ long or less, acute, striate-nerved; petioles glabrous, 1′–3½′ long; leaflets ovate, membranous, glabrous, 4′ long or less, acuminate at the apex, rounded or subtruncate at the base, the terminal one equilateral, long-stalked, the others short-stalked and obliquely inequilateral; racemes long-peduncled, puberulent, loosely several–many-flowered, 3′–5′ long; pedicels filiform, 4″–6½″ long; calyx broadly campanulate, its teeth broad and short; corolla white to purple, about 5″ long, the standard suborbicular, clawed; pod flat, curved, acute at each end, about 2′ long, 4″–5″ wide; seeds obliquely oblong, little flattened, brown, shining, 3″ long. [*P. semierectus* of Reade.]

Rocky woodlands between Castle Harbor and Harrington Sound. Endemic. Nearest related to *P. polystachyus* (L.) B.S.P., of the eastern United States. H. B. Small records the occurrence of this plant at Hungry Bay, also, but this record may apply to *Vigna repens*, which is abundant there. The species is here first described botanically.

Phaseolus vulgàris L., KIDNEY BEAN, FRENCH BEAN, SIX-WEEK BEAN, probably South American in origin, is largely and successfully grown as a garden crop, as also **P. lunàtus** L., LIMA BEAN.

Phaseolus multiflòrus Willd., SCARLET RUNNER, of tropical America, grown in gardens, is a long, finely pubescent vine, with rhombic-ovate leaflets, and showy red flowers in racemes, its pods 3′ to 6′ long, its seeds black and red.

9. **VÍGNA** Savi.

Herbaceous vines, or sometimes erect herbs, with pinnately 3-foliolate stipulate leaves, the leaflets broad. Flowers clustered at the ends of long axillary peduncles, yellowish or purplish, the rachis of the head or raceme knotty, the bracts and bractlets early deciduous. Calyx 5-toothed, or the 2 upper teeth united. Standard nearly orbicular, auricled at the base; wings shorter than the standard; keel about equalling the standard, slightly incurved. Stamens diadelphous (9 and 1). Ovary sessile; ovules numerous; style

bearded along the inner side; stigma oblique. Pod linear, nearly terete, 2-valved. [In honor of Domenic Vigni, a commentator on Theophrastus.] About 30 species, natives of warm tropical regions, the following typical.



1. Vigna rèpens (L.) Kuntze. YELLOW VIGNA. (Fig. 206.) Foliage usually pubescent with rather appressed hairs. Stems trailing or climbing, branching, when pubescent the hairs reflexed; leaflets 3, ovate to lanceolate or linear, ¾′–3′ long, acute, more or less distinctly reticulated, short-stalked; petioles usually longer than the leaflets; peduncles surpassing the subtending petioles, retrorsely pubescent at the top; pedicels about 1″ long, corymbose; calyx campanulate, oblique, its lobes triangular to lanceolate; corolla yellowish-brown; standard with a nearly reniform, notched blade, less than 10″ long; pods linear, about 1′ long, nearly terete, pubescent. [*Dolichos repens* L.; *D. luteolus* Jacq.; *Vigna luteola* Benth.]

Roadsides and moist grounds, especially abundant along marshes from Hungry Bay eastward in Paget and Devonshire. Naturalized from tropical America or the southeastern United States. Flowers from spring to autumn. Not, as Verrill states, a characteristic seaside vine.

Vigna sinènsis (L.) Endl., COW-PEA, Asiatic, sometimes grown as a green manure crop, is an annual with trailing or climbing stems, the leaves with 3 acute or blunt leaflets 2′–4′ long, the yellowish flowers about 9″ long, the linear, fleshy pod 4′–7′ long. [*Dolichos sinensis* L.]

10. DÓLICHOS L.

Climbing or trailing vines, with 3-foliolate stipellate leaves, and white to purple flowers variously clustered or sometimes solitary, their bracts small or caducous. Calyx campanulate, its two upper teeth united. Standard suborbicular; wings obovate, curved, adnate to the incurved keel. Stamens 9 and 1, their anthers all alike. Ovary many-ovuled; style bearded or penicillate below the terminal stigma. Pod flat, mostly somewhat curved, beaked. Seeds subglobose or flattened. [Greek name of some bean, referring to its long pods.] About 30 species, of tropical distribution, the following typical.

1. Dolichos Làblab L. Black Bean. Hyacinth Bean. (Fig. 207.) Sparingly pubescent, climbing or trailing, 15° long or less. Leaves long-petioled, leaflets ovate, acute or acuminate, 1½′–4′ long, the terminal one equilateral and long-stalked, the others inequilateral and short-stalked; racemes axillary, several-flowered, exceeding the leaves; flowers short-pedicelled, 7″–10″ broad, white to purple; pods about 3′ long, nearly 1′ wide, the upper edge nearly straight, the lower curved and glandular-roughened; seeds somewhat compressed, black with a white linear strophiole, about 5″ long.

Spontaneous after cultivation; frequent in gardens but not grown as a crop. Native of the Old World tropics, widely cultivated and naturalized in tropical and temperate America. Flowers in Bermuda in autumn.



Dolichos sphaerospèrmus (L.) DC., Black-eyed Pea, is recorded by Reade as cultivated in summer and by H. B. Small as frequent in fields; I have not met with it. [*Phaseolus sphaerospermus* L.]

11. **CANAVÀLI** Adans.

Perennial vines. Leaves pinnately 3-foliolate; leaflets entire. Flowers large, in axillary pedunculed racemes. Calyx 2-lipped, the upper lip truncate or 2-lobed, the lower one entire or 3-lobed. Standard reflexed, suborbicular; wings curved or twisted; keel-petals incurved, obtuse or with an inflexed or spiral beak. Stamens diadelphous (9 and 1) or monadelphous to the middle. Style glabrous, incurved. Ovules several. Pod oblong or broadly linear, 2-valved. [Aboriginal name.] About 15 species, natives of tropical regions. Type species: *Dolichos ensiformis* L.



1. Canavali lineàta (Thunb.) DC. Bay Bean. Bay Hops. (Fig. 208.) Foliage finely strigillose. Stems prostrate or climbing, 3°–25° long, branching; leaflets 3, leathery, suborbicular to oval or obovate, 1½′–4′ long, rounded or broadly cuneate at the base; racemes surpassing the subtending leaves; peduncles often longer than the racemes; pedicels spur-like; calyx helmet-like, 7″–9″ long, constricted at the base; corolla pink; pods broadly linear, 4′–5′ long; seeds oblong, brown. [*Dolichos lineatus* Thunb.; *Canavalia obtusifolia* DC.; *Dolichos roseus* of Reade; *Dolichos Canavalia* of H. B. Small.]

Sand dunes and sea beaches. Native, Southeastern United States, West Indies, tropical America and Old World. Flowers from summer to autumn. Its seeds probably transported to Bermuda by [illegible]

12. VÍCIA [Tourn.] L.

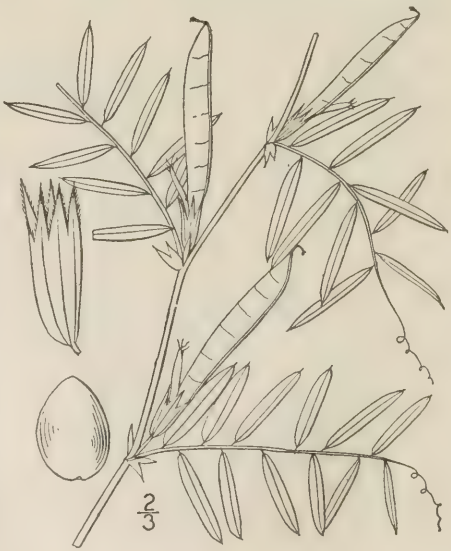
Climbing or trailing, herbaceous vines, rarely erect herbs, with pinnate mostly tendril-bearing leaves, half-sagittate or entire stipules, and axillary, mostly racemose flowers. Calyx-tube somewhat oblique, obtuse at the base, its teeth about equal. Standard obovate or oblong, emarginate, clawed; wings obliquely oblong, adherent to the shorter oblong curved keel. Stamens diadelphous (9 and 1), or monadelphous below. Ovules ∞; style very slender, with a tuft or ring of hairs at its summit. Pod flat, dehiscent, 2-valved, continuous between the seeds. [The classical Latin name of the Vetch.] About 120 species of wide distribution. Type species: *Vicia sativa* L.

Leaflets oblong, oval or obovate. 1. *V. sativa.*
Leaflets narrowly linear to oblanceolate. 2. *V. angustifolia.*



1. Vicia sativa L. COMMON VETCH OR TARE. PEBBLE-VETCH. (Fig. 209.) Pubescent or glabrate, spreading, 1°–3° long. Stipules broad, generally sharply toothed; leaves short-petioled; leaflets 8–14, obovate, oblong or oblanceolate, obtuse, truncate or retuse and mucronate at the apex, narrowed at the base, ¾′–1¼′ long; flowers bluish-purple, about 1′ long; calyx-teeth about as long as the tube; pod linear-oblong, glabrous, 1½′–3′ long, 5–10-seeded.

Fields and waste grounds. Naturalized from Europe. Naturalized in North America. Flowers in winter and spring.



2. Vicia angustifòlia Roth. SMALLER COMMON VETCH. (Fig. 210.) Glabrous or puberulent; stem slender, 1°–2° long. Stipules mostly half-sagittate, toothed or entire; leaves short-petioled, or nearly sessile; leaflets 8–16, linear, lanceolate or oblanceolate, 5″–17″ long, mucronulate, those of the lower leaves commonly obovate, broader and shorter; flowers 1 or 2 in the upper axils, purple, 6″–8″ long; calyx-teeth as long as the tube or shorter; pod linear, glabrous, 1′–2′ long.

Cultivated ground, Abbotsford, 1914. Widely naturalized in eastern North America. Native of Europe. Flowers in spring and summer.

Vicia villòsa Roth, HAIRY VETCH, European, annual or biennial, occasionally grown for fodder, and sometimes persistent for a few seasons in cultivated ground, is a hairy vine about 2° long, its leaves with 5–9 pairs of oblong or linear leaflets, its numerous blue flowers about 8″ long, in stalked, axillary racemes, the claw of the standard about one half as long as the blade, the flat, oblong, few-seeded pod about 1′ long.

Vicia Fàba L., BROAD BEAN, WINDSOR BEAN, PORTUGUESE BEAN, native of Asia or northern Africa, grown for its edible seeds, is a nearly erect, nearly glabrous annual, its leaves with 2–6 oblong or elliptic leaflets 2′–3′ long; the axillary whitish flowers have a dark blue blotch on the standard; the fleshy pods are 3′ long or more.

Pisum satívum L., PEA, of unknown origin, is grown to some extent in gardens for its seeds, and its vines for fodder.

Arachis hypogaèa L., PEANUT, EARTHNUT, probably South American, is locally grown in gardens, but is not an important crop in Bermuda.

Clitoria Ternàtea L., BLUE PEA, tropical African, widely naturalized in the West Indies is a climbing vine, commonly planted on porches and walls, has pinnate leaves of few ovate blunt leaflets and large solitary showy blue flowers, short-stalked in the axils; its flat pods are 3′ or 4′ long.

Lefroy records the successful introduction of *Clitoria brasiliensis* L., PURPLE-FLOWERING PEA of Brazil, now referred to the genus *Bradburya*.

Lathyrus odoràtus L., SWEET PEA, Sicilian, is widely grown in flower-gardens; it is an herbaceous, annual vine, the leaves of one pair of leaflets and a branched tendril, the showy flowers white, red, blue or yellow.

Lathyrus latifòlius L., BROAD-LEAVED EVERLASTING PEA, European, a perennial vine, the leaves with 2 large oblong-lanceolate leaflets and a branched tendril, the stem and petioles winged, the showy flowers white to purple, is occasional in gardens.

Genista hispànica L., SPANISH GENISTA, European, seen in the collection at the Agricultural Station in 1913, is a low, very spiny shrub, with villous branches, simple lanceolate acute leaves about ½′ long, the flowers in short racemes.

Colutea arboréscens L., BLADDER SENNA, of the Mediterranean region, is recorded by Lefroy as raised from seed and flowered at Hamilton prior to 1877. It is a large shrub, with pinnate leaves of 9–13 elliptic leaflets which are 1′ long or less, yellow flowers in small racemes, and inflated pods 2′–3′ long, narrowed at both ends.

Adenocarpus commutàtus Guss., of southern Europe, grown by Lefroy at Mt. Langton from 1874 to 1877, is a pubescent shrub with 3-foliolate leaves and yellow racemose flowers, the pod flat and glandular. [*A. telonensis* DC.]

Cytisus Labùrnum L., GOLDEN-CHAIN, European, occasionally planted for ornament, has not become luxuriant. It is a small tree, up to 25° high, with 3-foliolate, petioled leaves and long pendent racemes of bright yellow flowers. [*Laburnum vulgare* Griseb.]

Cytisus álbus (Lam.) Link, WHITE CYTISUS, of the Mediterranean region, grown at Wood Haven in 1914, is a shrub, 2°–3° high, with long slender branches, the petioled, 3-foliolate, clustered leaves less than 1′ long, the leaflets obovate, sessile, appressed-pubescent; its white flowers are about 5″ long, its pods usually with 2 seeds. [*Genista alba* Lam.]

Cytisus canariènsis L., GARDEN GENISTA, of the Canary Islands, a finely pubescent shrub 4°–6° high, with petioled 3-foliolate leaves about 1′ long, the leaflets obovate, blunt, cuneate, the yellow flowers racemose, is occasionally grown for ornament.

Spartium júnceum L., Spanish Broom, European, recorded by Jones in 1873 as lately introduced by Lefroy and expected to be of great value in binding drifting sands on the southern shores, is said by Lefroy to have been raised from seed and flowered at Mt. Langton, but never established itself. It is a shrub, with stiff, round branches, few and small narrow leaves and large, bright yellow flowers.

Ulex europaèus L., Gorse, European, a yellow-flowered shrub with linear sharp-pointed leaves, has been grown at times for ornament and interest but does not succeed well.

Kraunhia frutéscens (L.) Greene [*Wistaria frutescens* Poir.], North American Wistaria, a woody vine with pinnate leaves and pendent racemes of purplish flowers, is occasionally planted about houses.

Lonchocarpus violàceus H.B.K., Violet Lonchocarpus, West Indian, a tree with pinnate leaves of 7–9 ovate pointed leaflets and racemose violet flowers followed by flat 1-seeded stalked pods, is occasionally planted for shade and ornament, and is healthy and luxuriant.

Robinia Pseudoacàcia L., North American Acacia, Locust-tree, a hard-wooded tree with rough bark, thin, odd-pinnate leaves of 9–19 stalked leaflets and racemose white flowers, is occasionally planted for ornament, and some rather large trees may be seen.

Jones records a plant of this family as *Robinia dubia*. This name has been given by authors to three different trees; I can not determine which is meant.

Codariocalyx gỳrans (L. f.) Hassk., Telegraph-plant, of southern Asia, formerly grown at Mt. Langton, is an interesting herbaceous plant about 3° high, its leaves with 3 oblong leaflets, the 2 lateral much smaller than the terminal one, and move rather abruptly in sunshine into various positions; its purple flowers are panicled, and its pods jointed. [*Desmodium gyrans* DC.]

Toluifera peruífera (L. f.) Baill., Balsam of Peru, South American, a balsamiferous tree with pinnately compound leaves, shining, reticulate-veined ovate leaflets, racemose irregular flowers and curiously winged pods bearing one seed in the end, was successfully introduced, according to Lefroy. [*Myrospermum peruiferum* DC.]

Toluifera Balsàmum L., Balsam of Tolu, recorded by Jones, also South American, was represented by a young tree at the Agricultural Station in 1913. [*Myrospermum toluiferum* DC.]

Erythrina Corallodéndron L., Sword-flower, Coral-tree, West Indian, a large tree with prickly twigs, yellow wood, 3-foliolate leaves, ovate, thin, glabrous leaflets and scarlet flowers appearing in large terminal clusters before the leaves, the corolla narrow, with the petals parallel, the long narrow pods containing many red seeds, is planted for ornament.

Erythrina velutìna Willd., Velvety Coral-tree, West Indian, a large tree with 3-foliolate leaves, the broadly ovate blunt leaflets hairy beneath, the flowers bright red, is represented by a few fine specimens; a very large tree stood near the east end of Devonshire Marsh in 1912.

Erythrina Crista-gàlli L., Cockspur Coral-tree, South American, a shrub or small tree, the branches slender, glabrous and sometimes vine-like, habitually dying back, the 3 oblong-ovate, short-pointed, glabrous leaflets about 2½′ long, the showy crimson and scarlet flowers clustered, on slender pedicels, the broad standard petal becoming reflexed, somewhat longer than the keel, is occasionally planted for ornament.

Erythrina arbòrea (Chapm.) J. K. Small, a low Floridian species, with glabrous 3-lobed leaflets, the middle lobe long-pointed, is occasional in gardens. [*E. herbacea arborea* Chapm.]

Erythrina speciòsa Andr., ELEGANT SWORD-FLOWER, West Indian, planted for ornament, resembles *E. Corallodendron*, but its leaflets are 3-lobed and long-acuminate.

Erythrina índica Lam., INDIAN SWORD-FLOWER, East Indian, recorded by Jones, and by H. B. Small, is a large tree with a prickly trunk, the 3 leaflets 4′–6′ long, the flowers about 2½′ long, in dense racemes, the oblique calyx spathaceous, splitting along the back.

Erythrina càffra Thunb., CAPE SWORD-FLOWER, South African, of which H. B. Small records a large tree on grounds adjoining Rosebank, Hamilton, prior to 1901, is a prickly tree with ovate, glabrous leaflets, the scarlet, racemed flowers about 2′ long, the calyx tomentulose. Lefroy records having raised plants from Cape seed.

Dalbergia Sissoo Roxb., SISSOO TREE, East Indian, experimentally planted at the Public Garden, St. Georges, in 1914, has pinnate leaves of 5 broadly elliptic to obovate leaflets 3′–4′ long and axillary panicles of small, white flowers.

Onobrychis satíva L., SAINFOIN, of Europe and Asia, a perennial herb 1°–2° high, with pinnate leaves of numerous oblong leaflets, and rather dense spikes of pink flowers on peduncles longer than the leaves, mentioned by Lefroy as said to be occasionally grown, but not seen by him, and recorded by H. B. Small as "common along roadsides, flowering in July," has not been observed by me in Bermuda. [*Hedysarum Onobrychis* of Lefroy and of H. S. Small.]

Calpurnia aùrea (Lam.) Baker, GOLDEN CALPURNIA, South African, a shrub or small tree up to about 15° high, seen in a fine specimen at the Agricultural Station in 1913, has unevenly pinnate leaves of 9–21 oval, obtuse or emarginate entire leaflets about 1′ long, glabrous above, slightly pubescent beneath, bright yellow, flowers about ½′ long in racemes, followed by flat, linear, subulate-tipped pods 2′–3′ long. [*Virgilia aurea* Lam.; *Calpurnia lasiogyne* E. Meyer.]

Dolicholus praecatòrius (Humb.) Rose, SPOTTED DOLICHOLUS, Mexican, a vine, climbing to a length of 30°, with 3-foliolate, pubescent leaves, the ovate thin entire acuminate leaflets 1′–2′ long, the small yellow flowers in loose racemes, the short, flattened, 2-seeded pods about ½′ long, the subglobose seeds scarlet with a black spot, was seen at Wood Haven in 1914. [*Glycine praecatoria* Humb.]

Psoralea glandulòsa L., CHILEAN PSORALEA, of western South America, a shrub with 3-foliolate, black-punctate leaves, and small blue-purple flowers in narrow racemes, was grown by Lefroy in 1874 and he records it as doing well up to 1877.

Hardenbergia Comptoniàna Lindl., COMPTON'S HARDENBERGIA, Australian, a woody vine, the leaves with 3 or 5 leaflets 1½′–5′ long, the small violet flowers in racemes, the pod leathery, 1½′ long, was raised from seed by Lefroy and flowered at Mt. Langton as recorded by him.

Anthyllis Bárba-Jòvis L., JOVE'S BEARD, of southern Europe, recorded by Lefroy as introduced in 1874 and living in 1877, is a tall, pinnate-leaved shrub, the foliage silky tomentose, the light yellow flowers capitate.

Lotus jacobaèus L., CAPE VERDE LOTUS, described by Reade as frequently cultivated as a garden flower, and occasional in cultivated grounds as a weed and said by H. B. Small to be "not common yet, but seems thriving" was not known to Lefroy as Bermudian, nor is it otherwise recorded, nor has it been found by recent collectors. It is a low shrubby plant with 3-foliolate leaves, the sessile leaflets oblanceolate to linear, the showy flowers capitate on long peduncles, the standard dark purple.

Bradburya virginiàna (L.) Kuntze, Spurred Butterfly Pea, North American and West Indian, listed as Bermudian by Rein, has not been found by subsequent collectors. It is an herbaceous vine with purplish pea-like flowers and narrow linear flat pods. [*Centrosema virginiana* Benth.]

Balsamocarpon brevifòlium Clos., a Chilian shrub, grown from seed by Lefroy in 1875, failed to survive.

Lefroy records the existence of an indigenous species of *Aeschynomene*, resembling a small Mimosa at Paynter's Vale, but a thorough search of that locality at different times in the season has failed to reveal its presence there at this time.

Lefroy also records the introduction of a species of *Argyrolobium* in 1874, which lived until 1877.

Order 18. GERANIÀLES.

Herbs, shrubs or trees, usually with petals, and these separate (wanting in most Euphorbiaceae, and in some species of *Zanthoxylum* in Rutaceae); sepals mostly distinct; stamens few, rarely more than twice as many as the sepals, opposite them when as many; ovary superior, mostly compound; ovules pendulous, the raphe toward the axis of the ovary.

Petals present, usually as many as the sepals.		
Tissues of the plant devoid of secreting cells or glands.		
Styles united around a column from which they break elastically when mature.	Fam.	1. Geraniaceae.
Styles distinct, or permanently united.		
Calyx irregular, one of the sepals spurred or saccate.		
Anthers separate; carpels 1-ovuled.	Fam.	2. Tropaeolaceae.
Anthers united; carpels several-ovuled.	Fam.	3. Balsaminaceae.
Calyx regular, the sepals all alike.		
Filaments united below or at the base; herbs.		
Stamens as many as the sepals; leaves simple.	Fam.	4. Linaceae.
Stamens twice as many as the sepals; leaves compound.	Fam.	5. Oxalidaceae.
Filaments separate.		
Styles united; leaves mostly compound.	Fam.	6. Zygophyllaceae.
Styles separate; leaves simple.	Fam.	7. Malpighiaceae.
Tissues of the plant with secreting cells or glands.		
Leaves punctate.	Fam.	8. Rutaceae.
Leaves not punctate.		
Carpels separate.	Fam.	9. Surianaceae.
Carpels united.		
Filaments separate.	Fam.	10. Simaroubaceae.
Filaments united.	Fam.	11. Meliaceae.
Flowers often apetalous, monoecious; carpels mostly 3.	Fam.	12. Euphorbiaceae.

Family 1. GERANIÀCEAE J. St. Hil.

Geranium Family.

Herbs with alternate or opposite leaves, and axillary solitary or clustered perfect regular flowers. Stipules commonly present. Sepals 5 (rarely fewer), mostly persistent. Petals of the same number, hypogynous. Stamens as many as the sepals, or 2–3 times as many, distinct; anthers 2-celled, versatile. Ovary 1, usually 5-lobed; ovules 1 or 2 in each cavity. Fruit capsular. Embryo straight or curved; cotyledons flat or plicate. About 12 genera and 470 species, natives of temperate regions, most abundant in South Africa.

Corolla regular; calyx spurless.	1. *Geranium*.
Corolla somewhat irregular; calyx spurred.	2. *Pelargonium*.

1. GERANIUM L.

Herbs with stipulate, palmately lobed, cleft or divided leaves, and axillary 1–2-flowered peduncles. Flowers regular, 5-merous. Sepals 5, imbricated. Petals 5, hypogynous, imbricated. Stamens 10 (rarely 5), generally 5 longer and 5 shorter. Ovary 5-lobed, 5-celled, beaked with the compound style. Ovules 2 in each cavity. Capsule elastically dehiscent, the 5 cavities 1-seeded and long tailed by the persistent style-divisions which are naked on the inner side. [Greek, a crane, from the long beak of the fruit.] About 190 species, widely distributed in temperate regions. Type species: *Geranium sylvaticum* L.

Seeds finely reticulated; beak of fruit about 1′ long. 1. *G. carolinianum*.
Seeds smooth; beak of fruit about 5″ long. 2. *G. pusillum*.

1. Geranium carolinianum L. CAROLINA CRANE'S-BILL. (Fig. 211.) Annual, erect, generally branched, stout, 6′–15′ high, loosely pubescent with spreading often glandular gray hairs. Leaves reniform-orbicular, 1′–3′ wide, deeply cleft into 5–9 oblong or obovate cuneate toothed or lobed segments; peduncles rather short and stout; flowers in compact clusters, pale pink or whitish, 4″–7″ broad; sepals ovate, ciliate, about equalling the obovate emarginate petals; ovary-lobes hispid-pubescent; persistent filaments not longer than the carpels; beak nearly 1′ long; seeds finely reticulated. [*G. dissectum* of Lefroy.]

Frequent in waste and cultivated grounds. Naturalized. Native of eastern North America. Flowers in spring and summer.





2. Geranium pusillum Burm. f. SMALL-FLOWERED CRANE'S-BILL. (Fig. 212.) Widely branching, slender, pubescent or villous, 4′–16′ long. Leaves petioled, reniform orbicular, ½′–1½′ wide, deeply divided into 7–9 oblong, or sometimes linear-oblong, entire or 3-toothed, cuneate lobes; peduncles short, 3″–9″ long; pedicels 3″–5″ broad; petals notched; capsule-lobes hairy, keeled, not wrinkled; beak about 5″ long, canescent; seeds smooth.

Recorded as found in Bermuda by Jones, Lefroy, Hemsley and H. B. Small, but not recently collected, and not mentioned by Reade. Native of Europe. Naturalized in the United States.

2. **PELARGÓNIUM** L'Her.

Mostly perennial herbs, sometimes woody, the leaves various, the flowers clustered. Sepals 5, unequal, one of them with a spur adnate to the pedicel. Petals usually 5, the two upper somewhat larger than the 3 lower. Stamens 10, not all anther-bearing. Ovary beaked by the compound style, the styles pubescent on the inner side, coiling when separating from the axis. Seeds smooth, pitted or wrinkled. [Greek, the fruit similar to the bill of a stork.] Perhaps 200 species, mostly natives of South Africa. Type species: *Pelargonium hirsutum* (L.) Soland.



1. Pelargonium capitàtum (L.) L'Her. CAPITATE GARDEN GERANIUM. (Fig. 213.) Spreading or trailing, somewhat woody, the branches 1° long or more, pubescent with long hairs. Leaves orbicular to reniform, 2′–3′ wide, shallowly lobed, the lobes rounded and toothed, the petioles as long as the blades or shorter; umbels axillary, long-peduncled, capitate; petals purple, about 6″ long; carpels about 2″ long, pubescent; seeds finely wrinkled. [*Geranium capitatum* L.]

Borders of woods, Paynter's Vale, 1909. Naturalized. Native of southern Africa. Occasionally planted for ornament. Naturalized in southern California.

Many kinds of Garden Geraniums of this genus, especially double-flowered races, grow luxuriantly in Bermuda gardens, with flowers from white to scarlet. Most of these are hybrids between *P. zonale* and *P. inquinans*.

Pelargonium peltàtum (L.) Ait., IVY-LEAVED GERANIUM, South African, a trailing or straggling species, with succulent foliage, somewhat zigzag stems about 2°, long, slender-petioled peltate 5-lobed nearly orbicular leaves 1½′–3′ broad, and long few-flowered peduncles, the red to white petals about twice as long as the calyx, is occasionally grown in flower-gardens.

Pelargonium exstipulàtum Ait., also South African, is a bushy species 1½°–2° high, with slender-petioled, finely velvety, subcordate shallowly 3-lobed and toothed leaves about 1′ broad, and few white flowers, the petals about ½′ long. A plant agreeing with the description of this species was observed in the Montrose garden in 1913.

Pelargonium terebinthinàceum (Cav.) J. K. Small, ROSE GERANIUM, South African, commonly planted, is strong-scented, pubescent, 2°–3° high, with petioled leaves nearly orbicular in outline, palmately 3–7-lobed, with toothed or pinnatifid segments; the pink or purplish flowers are in peduncled cymes, the petals 6″–8″ long. [*Geranium terebinthinaceum* Cav.; *P. graveolens* Ait.]

Family 2. **TROPAEOLÀCEAE** Lindl.

NASTURTIUM FAMILY.

Herbs, spreading or climbing, with petioled, often peltate leaves, and large, irregular perfect flowers, mostly solitary, axillary and pedunculed. Calyx produced posteriorly into a spur, 5-lobed. Petals normally 5, the upper more or less unlike the lower. Stamens 8, declined, unequal; filaments distinct. Ovary 3-celled, 3-lobed; style filiform. Ovules solitary in each ovary cavity, pendulous. Carpels indehiscent, fleshy, at length separating. Seeds without endosperm. Only the following genus, interesting and peculiar in the structure of its flowers.

1. **TROPAÈOLUM** L.

About 40 species, natives of Central and South America, the following typical one widely cultivated. [Greek, turning, or change.]

1. Tropaeolum màjus L. GARDEN NASTURTIUM. (Fig. 214.) Annual, succulent, glabrous; stems weak, spreading, 1° long or more. Leaves long-petioled, peltate below the middle, flaccid, nearly orbicular, 1½′–4′ broad, radiately veined, the margin slightly repand; peduncles about as long as the petioles; flowers 1′–2½′ broad, yellow to orange; spur often 1′ long; fruit 3-lobed, depressed-globose, about ½′ broad.

Commonly and highly successfully grown in flower-gardens and occasionally escaped into waste places. Native of Peru. Flowers nearly throughout the year. The fruits make good pickles, and the young leaves are sometimes used in salads. Both double-flowered and dwarf races are in cultivation, and forms supposed to be of hybrid origin exist.



Family 3. **BALSAMINÀCEAE** Lindl.

JEWEL-WEED FAMILY.

Succulent herbs, with alternate thin simple dentate petioled leaves, and showy mostly very irregular axillary flowers. Sepals 3, the 2 lateral ones small, green, nerved, the posterior one large, petaloid, saccate, spurred. Petals 5, or 3 with 2 of them 2-cleft into dissimilar lobes. Stamens 5, short; filaments appendaged by scales on their inner side and more or less united; anthers coherent or connivent. Ovary oblong, 5-celled; style short, or none; stigma 5-toothed or 5-lobed; ovules several in each cavity. Fruit in the following genus an oblong or linear capsule, elastically dehiscent

into 5 spirally coiled valves, expelling the oblong ridged seeds. Endosperm none; embryo nearly straight; cotyledons flat. Later flowers small, cleistogamous, apetalous. About 250 species, mostly natives of tropical Asia. The family consists of the following genus and the monotypic Asiatic *Hydrocera*.

1. IMPÀTIENS L.

Characters of family, as given above. [Name in allusion to the elastically bursting pods.]

Impatiens Balsamìna L., Garden Balsam, Snap-weed, Indian, commonly cultivated in gardens, is an annual herb, 1°–3° tall, with oblanceolate, sharply toothed, petioled leaves and clustered rose-colored to white flowers, the hairy ovoid capsules about 10″ long. [*I. hortensis* of Jones and Reade.]

Impatiens Sultàni Hook. f., Red Balsam, from Zanzibar, a succulent annual 2° high or less, with thin serrate slender-petioled acute leaves 2′–3′ long, the rose-red flowers solitary on axillary peduncles, is grown in flower-borders. A race with white flowers is known, and this was, apparently, represented in 1914, in the garden at Orange Valley.

Family 4. **LINÀCEAE** Dumort.

Flax Family.

Herbs, or shrubs, with perfect regular nearly symmetrical flowers. Stipules mostly small or none. Sepals 5, rarely 4, imbricated, persistent. Petals of the same number and alternate with the sepals, imbricated, generally contorted. Stamens of the same number, alternate with the petals; filaments monadelphous at the base; anthers versatile, 2-celled. Ovary 1, 2–5-celled, or by false septa 4–10-celled. Ovules anatropous. Styles 2–5. Fruit mainly capsular. Seeds 1–2 in each cavity, oily; endosperm little or none; embryo straight; cotyledons flat. Some 14 genera and about 160 species of wide distribution.

1. LÌNUM L.

Herbs, sometimes woody at the base, with sessile leaves, and perfect flowers. Inflorescence cymose, racemose or paniculate. Stipules a pair of glands, or wanting. Sepals 5. Petals 5, fugacious. Stamens 5, sometimes with interspersed staminodia. Ovary 4–5-celled, or 8–10-celled by false partitions, the real cavities 2-ovuled. Capsule 5–10-valved. [The classical Latin name.] A few species, natives of temperate or warm regions, the following typical.

1. Linum usitatíssimum L. FLAX. LINSEED. (Fig. 215.) Annual, often tufted, branching above, 1°–2° high; leaves alternate, 3-nerved, lanceolate, ½′–1½′ long, 1″–3″ wide; inflorescence a terminal cymose leafy panicle; flowers 6″–8″ broad; pedicels slender; sepals oval, acuminate, the interior ones ciliate and 3-ribbed; petals obcuneate, crenulate, blue, twice the length of the sepals; capsule ovoid-conic, 3″–4″ long, indehiscent, the septa not ciliate.



Occasional in waste places. Introduced. Native of Europe. Naturalized in North America. Flowers in spring and summer. Flax is not cultivated in Bermuda.

Linum grandiflòrum Desf., FLOWERING FLAX, North African, frequent in flower-gardens, is a glabrous, branched annual about 2° high, with lanceolate acute leaves about 1′ long, and many slender-pedicelled flowers, the red obovate spreading petals much longer than the pointed sepals, the depressed-globose capsules about 4″ broad.

Erythroxylon Còca Lam., COCAINE TREE, Peruvian, of the related family ERYTHROXYLACEAE, a small glabrous tree, with alternate, oval to oval-obovate, short-petioled stipulate obtuse simple leaves 1′–3′ long, dark green above, pale and with two faint lines nearly parallel with the margin beneath, small pedicelled flowers solitary or few in the axils, the calyx 5-cleft, the corolla of 5 white petals, the 10 stamens united below into a tube, the 3-celled ovary ripening into a small drupe, was represented by a vigorous plant about 8° high in the collection at the Agricultural Station in 1913. The drug, cocaine, is derived from its leaves.

Family 5. **OXALIDÀCEAE** Lindl.

WOOD-SORREL FAMILY.

Leafy-stemmed or acaulescent herbs, or rarely shrubs, often with rootstocks or scaly bulbs, the sap sour. Leaves mostly palmately 3-foliolate, in some tropical species pinnate, or entire and peltate; stipules commonly present as scarious expansions of the petiole-bases; leaflets mostly obcordate. Flowers perfect, in umbel-like or forking cymes, or solitary, sometimes cleistogamous; peduncles mostly long. Sepals 5, often unequal. Petals 5, white, pink, purple or yellow. Stamens 10–15. Ovary 5-celled, 5-lobed; styles united, or distinct; ovules 2–many in each cavity; fruit a loculicidal globose or columnar capsule, rarely baccate. Embryo

straight, in fleshy endosperm. About 15 genera and over 300 species, chiefly of tropical distribution.

Plants acaulescent.
  Plants with elongated rootstocks. 1. *Bolboxalis.*
  Plants with coated bulbs. 2. *Ionoxalis.*
Plants caulescent. 3. *Xanthoxalis.*

1. BOLBÓXALIS J. K. Small.

Perennial acaulescent herbs with bulblet-bearing rootstocks. Leaves long-petioled, 3-foliolate, the leaflets sessile. Inflorescence long-peduncled, cymose, the pedicels subtended by scale-like bracts. Sepals 5, each with 2 tubercles at the apex. Petals 5, bright yellow, large. Stamens 10; filaments united at the base, the longer ones appendaged. Styles slender. Stigmas capitate. [Greek, bulbiferous *Oxalis.*] About 6 African species, the following typical.



1. Bolboxalis cérnua (Thunb.) J. K. Small. NODDING YELLOW WOOD-SORREL. BERMUDA BUTTERCUP. (Fig. 216.) Scapes 16′ high or less, erect, longer than the leaves. Leaflets broader than long, deeply obcordate, somewhat pubescent beneath, 1½′ wide or less; cyme several-flowered; pedicels pubescent, ½′–1′ long; flowers nodding, about 1½′ wide; sepals lanceolate, about 3″ long; capsules about 4″ long. [*Oxalis cernua* Thunb.]

Waste and cultivated grounds. Escaped from cultivation. Native of South Africa. Flowers in winter and spring. Introduced also into Florida and Mexico. A showy, yellow-flowered species, much planted in Bermuda gardens.

2. IONÓXALIS J. K. Small.

Perennial acaulescent herbs, with scaly bulbs. Leaves basal, the petioles dilated at the base; the blades palmately 3–10-foliolate; leaflets notched at the apex usually with orange tubercles in each sinus. Scapes erect, usually topped by umbel-like cymes. Flowers perfect, heterogonous. Sepals 5, with tubercles at the apex. Petals 5, rose-purple, rose-violet or white, much longer than the sepals. Stamens 10; filaments usually pubescent, united at the base. Capsule 5-celled. Seeds wrinkled, grooved or tubercled. [Greek, purple *Oxalis.*] Over 50 species, natives of America. Type species: ***Oxalis violacea*** L.

Cymes compound; leaflet-lobes rounded. 1. *I. Martiana.*
Cymes simple; leaflet-lobes ovate. 2. *I. intermedia.*

1. Ionoxalis Martiàna (Zucc.) J. K. Small. MARTIUS' PURPLE WOOD-SORREL. (Fig. 217.) Scapes villous, 1° high or less, as long as the leaves or longer; bulb-scales 3-ribbed. Leaflets 3, broadly obovate-obcordate, 1′–2½′ broad, broadly cuneate at the sessile base, somewhat pubescent, their lobes rounded, the petioles loosely villous; cymes several–many-flowered, compound; pedicels ½′–1½′ long; sepals 3″ long or less; petals violet to rose-purple, 6″–8″ long; longer filaments pubescent, the shorter mostly glabrous.

A pernicious weed in cultivated grounds, difficult to eradicate. Naturalized. Native of Brazil. Naturalized in the southern United States and in the West Indies. Flowers from autumn to spring. [*Oxalis violacea* of Lefroy and of Reade; *Oxalis Martiana* Zucc.] known locally as Sour-sop, as is the following species.





2. Ionoxalis intermèdia (A. Rich.) J. K. Small. CUBAN PURPLE WOOD-SORREL. (Fig. 218.) Scapes 1° high or less, glabrous or pubescent, as long as the leaves or longer; bulb-scales several-ribbed. Leaflets 3, much broader than long, sessile, their lobes ovate, obtuse, glabrous above, more or less pubescent beneath, the petioles sparingly pubescent; cymes simple, 5–12-flowered; pedicels glabrous, 5″–10″ long, very slender; sepals ovate, 2″–3″ long; petals violet, 5″–7″ long; longer filaments very pubescent, the shorter ones slightly so. [*Oxalis intermedia* A. Richard.]

Superabundant as a weed in fields between Castle Harbor and Harrington Sound, 1912. Native of Cuba. Naturalized in the Bahamas, St. Croix, Guadeloupe and Martinique. Flowers from autumn to spring.

3. XANTHÓXALIS J. K. Small.

Annual or perennial caulescent herbs, with rootstocks. Leaves alternate; stipules obsolete; blades palmately 3-foliolate; leaflets broadly obcordate, nearly sessile. Flowers perfect, heterogonous or homogonous. Sepals 5, narrow, imbricated. Corolla yellow, sometimes with a darker eye. Petals 5, surpassing the sepals, rounded or notched at the apex. Stamens 10; filaments glabrous or the longer ciliate. Capsule more or less elongated, columnar or narrowed upward, angled, 5-celled. Seeds several in each cavity, transversely ridged or tuberculate

by broken ridges. [Greek, yellow oxalis.] About 50 species, of wide distribution. Type species: *Oxalis corniculata* L.

Stems creeping, like the branches, with scattered lax hairs. 1. *X. corniculata.*
Stems not creeping, like the branches, closely pubescent with appressed hairs. 2. *X. stricta.*



1. Xanthoxalis corniculàta (L.) J. K. Small. YELLOW PROCUMBENT WOOD-SORREL. Stem branched at the base, the branches 2′–15′ long, creeping, somewhat pubescent with spreading or loosely appressed hairs; leaflets deep green, 3″–6″ broad or sometimes larger, ciliate and commonly with scattered hairs on the surface; pedicels minutely strigillose; sepals oblong to oblong-lanceolate, ciliate at the apex or only near it; petals 3″–5″ long; filaments glabrous; capsule 4″–7″ long. [*Oxalis corniculata* L.; *O. microphylla* of Lefroy; *O. repens* of Reade.]

Abundant in waste and cultivated grounds. Introduced. Widely distributed in warm and tropical regions. Probably native of tropical America. Flowers from autumn to summer.



2. Xanthoxalis stricta (L.) J. K. Small. UPRIGHT YELLOW WOOD-SORREL. (Fig. 220.) Stems tufted on woody rootstocks, or sometimes from annual roots, strigillose. Leaves usually numerous; leaflets bright green, 4″–8″ broad, glabrous or with a few scattered hairs; pedicels strigillose; sepals oblong or linear-lanceolate, 2″–3″ long, sparingly ciliate, more or less pubescent on the back; petals 3″–6″ long, pale or yellow; longer filaments glabrous; capsules stout, columnar, 8″–15″ long. [*Oxalis stricta* L.; *O. corniculata stricta* Sav.; *?O. Dillenii* of Reade.]

Occasional in waste and cultivated grounds, flowering in spring and summer. Native of temperate North America.

Caudoxalis Bowieàna (Lodd.) J. K. Small, BOWIE'S WOOD SORREL, South African, a very decorative species with orbicular-obovate rounded leaflets and scapose purple flowers 1½′–2′ wide, its rootstocks bearing distant pointed tubers, is planted in many gardens, flowering in winter. [*Oxalis Bowieana* Lodd.]

Michaux's record of *Oxalis Acetosella* L., of boreal North America and Europe, as Bermudian, is manifestly an error.

Family 6. **ZYGOPHYLLÀCEAE** Lindl.

CALTROP FAMILY.

Herbs, shrubs, or some tropical species trees, the branches often jointed to the nodes. Leaves mostly opposite, stipulate, pinnate, or 2–3-foliolate, the leaflets entire. Stipules persistent. Flowers perfect, axillary, peduncled. Sepals usually 5, distinct, or united by their bases. Petals the same number as the sepals, or none. Stamens as many as the petals, or 2–3 times as many, inserted on the base of the receptacle, the alternate ones sometimes longer; anthers versatile, longitudinally dehiscent; filaments usually with a small scale at the base or near the middle. Ovary 4–12-celled; style terminal; stigma usually simple; ovules 1–numerous in each cavity, pendulous or ascending. Fruit various. About 20 genera and 160 species, widely distributed in warm and tropical regions.

Guaiacum officinàle L., LIGNUM VITAE, West Indian, a small tree with evenly pinnate leaves of few broad leaflets, 1′–1½′ long, and large clusters of blue flowers, is occasional in gardens. A tree at Pembroke Hall was about 30° high in 1913.

Zygophyllum foètidum Schrad. & Wendl., BEAN CAPER, South African, a low shrubby plant with 2-foliolate leaves, the obovate leaflets glabrous, the nodding flowers axillary and solitary, is mentioned by Reade as growing in the Public Park prior to 1883.

Family 7. **MALPIGHIÀCEAE** Vent.

MALPIGHIA FAMILY.

Shrubs or trees, or shrubby herbs, with erect or climbing stems. Leaves mostly opposite, entire; stipules sometimes present. Flowers usually perfect, solitary or in terminal racemes, corymbs or umbel-like clusters. Calyx of 5, usually imbricated, sepals. Corolla of 5 mostly equal clawed, convolute petals, or rarely wanting. Stamens 5–10, perfect or partly sterile; filaments often united at the base; anthers 2-celled, often with enlarged connectives. Gynoecium of 2–4, or usually 3 carpels; ovary 1-celled, sometimes crested. Ovules solitary in each cavity, nearly orthotropous. Fruit of 2–3 pulpy or hard drupes, or sometimes capsular or nut-like. Seeds pendulous; endosperm wanting; embryo with thick often unequal cotyledons. About 60 genera and 700 species, in warm and tropical regions. Most of the species of *Malpighia* bear stinging hairs.

Malpighia punicifòlia L., FRENCH CHERRY, WEST INDIAN CHERRY, of tropical America, a shrub, or small tree up to 15° high, with rather thin, oblong to obovate, obtuse, short-petioled leaves 1′–3′ long, axillary cymes of small pink flowers, followed by scarlet or red drupes 5″–8″ in diameter, pleasantly acid and edible, is frequently grown in gardens.

Malpighia setòsa Spreng., recorded, with doubt, by Lefroy, has similar flowers and fruit but its leaves are abruptly pointed, undulate-dentate, pubescent beneath. It is native of Hispaniola and not known in Bermuda now.

Malpighia ùrens L., STINGING CHERRY, West Indian, recorded by Jones, is also a shrub or a small tree, with oblong to obovate, entire leaves, pink flowers, and edible, red fruits about 5″ in diameter.

Thryallis glaùca (Cav.) Kuntze, PALE THRYALLIS, Central American, seen in flower at Bellevue in 1913, is a slender shrub about 5° high, with thin oblong, slender petioled leaves 2′ long or less, and racemose or panicled showy yellow flowers about 1′ broad on slender pedicels, the fruit 3-lobed capsules 2″–3″ long.

Family 8. **RUTÀCEAE** Juss.

RUE FAMILY.

Trees or shrubs, rarely herbs, with heavy-scented and glandular-punctate foliage, mainly compound estipulate leaves, and perfect or polygamo-dioecious flowers. Sepals 4 or 5, or none. Petals 4 or 5, hypogynous or perigynous. Stamens of the same number, or twice as many, distinct, inserted on the receptacle; anthers 2-celled, mostly versatile. Disk annular. Pistils 2–5, distinct, or 1 and compound of 2–5 carpels. Fruit various. Endosperm generally fleshy, sometimes none. About 110 genera and 950 species, most abundant in South Africa and Australia.

Leaves pinnately compound; fruit capsular. 1. *Zanthoxylum.*
Leaves 1-foliolate; fruit a large berry with a rind. 2. *Citrus.*

1. **ZANTHÓXYLUM** L.

Trees or shrubs with alternate odd-pinnate leaves, the twigs and petioles commonly prickly. Flowers axillary or terminal, cymose, whitish or greenish, mostly small. Sepals 4 or 5, or none. Petals imbricated. Staminate flowers with 4 or 5 hypogynous stamens. Pistillate flowers with 2–5 distinct pistils, rarely with some stamens. Carpels 2-ovuled. Pods 2-valved, 1–2-seeded. Seeds short, black and shining. [Greek, yellow-wood.] (About 150 species, of temperate and tropical regions. Type species: *Zanthoxylum Clava-herculis* L.



1. Zanthoxylum flàvum Vahl., YELLOW-WOOD. SATIN-WOOD. (Fig. 221.) An unarmed evergreen shrub or smooth-barked tree, with spreading branches, its twigs, foliage and inflorescence tomentose, or glabrate in age. Leaf-blades pinnately compound, 4′–12′ long; leaflets 5–11, the blades oblong or ovate, or the terminal one oval, 1½′–3′ long, obtuse, rounded at the apex, slightly crenate or nearly entire, inequilateral, short-petioled, shining above, pubescent with stellate hairs when young, becoming glabrous; panicles 3′–6′ long; pedicels ½″–1½″ long; flowers in terminal cymes; calyx about ½″ broad; sepals triangular-ovate, acutish; petals 5, oblong or oblong-ovate, recurved, thickish; stamens longer than the petals; ovary glandular-punctate; carpels obovoid, 3″ long, glandular-punctate; seeds lenticular, 2″ broad, faintly reticulated, black. [*Zanthoxalum aromaticum* of Verrill; *Z. Clava-Herculis* of Lefroy and of H. B. Small.]

Rocky woodlands between Harrington Sound and Castle Harbor. Two large trees and some 15 small ones known only. Native. Florida and the West Indies. Flowers in autumn.

The large tree recorded by Lefroy as 30½ inches in girth about 1872, was, in December, 1912, 33½ inches (83 cm.) in girth; it bears Lefroy's initials (RHL), presumably cut by himself; it had thus increased less than 3 inches in girth in 40 years. This tree flowered and fruited abundantly in September, 1913. The species was much more widely distributed in Bermuda many years

ago, but nearly exterminated by cutting for its valuable lumber, which was exported to England; this business was restricted by gubernatorial proclamation as early as 1632. Old records prove the occurrence of large trees on Cooper's Island and on Ireland Island prior to 1693.

2. CÍTRUS L.

Shrubs and trees, with more or less spinescent branches, pervaded by a fragrant volatile oil. Leaves persistent, 1-foliolate, leathery; the petiole often winged. Flowers perfect, regular, axillary. Sepals united into a cup-like calyx. Petals 5 or rarely 4–8, white, at least within, deciduous. Stamens 20–60; filaments inserted around an annular or cup-like disk. Ovary several-celled, superior; styles united, deciduous. Ovules several in each cavity. Berries with a bitter oily rind. Seeds pale, several in each cavity (wanting in seedless races); endosperm none; embryo with fleshy cotyledons. [Greek, citron.] Some 30 described species, natives of Asia. Type species: *Citrus medica* L.

Petiole-wings broad; fruit subglobose. 1. *C. vulgaris.*
Petiole-wings narrow; fruit oblong, commonly pointed. 2. *C. Limonum.*

1. Citrus vulgàris Risso. BITTER ORANGE. (Fig. 222.) A tree, up to 25° high, the young branches armed with thorns. Leaflet ovate, 2½′–5′ long, acute or acuminate, the petiole broadly winged; flowers in cymes, fragrant, the oblong petals about 9″ long; fruit subglobose, 3′–4′ long, its thick rind bitter, its pulp bitter and sour. [*C. bigaradia* Loisel.]

Woodlands and hillsides. Naturalized. Native of southern Asia. Naturalized in Florida and in the West Indies. Flowers in spring and summer.





2. Citrus Limònum (L.) Risso. LEMON. (Fig. 223.) A tree up to 20° high, the branches commonly thorny. Leaflet ovate or elliptic, 4′ long or less, crenate, acute or rounded; petiole narrowly winged; flowers solitary or in pairs in the axils; petals usually purplish without; fruit oblong or ellipsoid, 2½′–4′ long, usually pointed, the rind thin, the pulp sour. [*C. Medica Limon* L.]

Woodlands and hillsides. Spontaneous after cultivation and naturalized. Native of southern Asia. Flowers in spring and summer.

Citrus Aurántium L., SWEET ORANGE, Asiatic, was formerly extensively planted. It has entire leaflets with narrowly winged or merely margined petioles and a globose orange yellow fruit with a separable rind and sweet pulp. The home supply of oranges does not nearly meet the demand for them, scale-insects being destructive.

Citrus Lìma Lunan, LIME, Asiatic, is commonly planted. Its toothed leaflets have wingless and marginless petioles, and the small acid fruit is globose or oblong with a very thin rind. The tree has become almost naturalized locally. [*Citrus Limetta* Risso.]

Citrus Médica L., CITRON, Asiatic, is also planted. Its entire leaflets have wingless and marginless petioles; the large fruit has a very thick rind, used for flavoring and for preserves.

Citrus decumàna L., GRAPE-FRUIT, POMELO, SHADDOCK, East Indian, planted for its large, acid fruit, has hairy twigs and pedicels, broadly winged petioles, and fruit up to 7′ in diameter, globular or nearly so. There are many varieties or races, the Forbidden Fruit being one of them, its fruit smaller. Lefroy uses the name *Citrus racemosus* for the Grape-fruit.

Citrus nóbilis Lour., MANDARIN ORANGE, Chinese, has occasionally been planted; it has lanceolate, slightly crenate leaflets, the petioles little winged, and its fruit is more or less compressed, 2′–2½′ broad, the rind readily separable from the sweet pulp.

Triphasia trifòlia (Burm. f.) P. Wilson, BERGAMOT LIME, of tropical Asia, frequent in gardens, is a spiny shrub about 6° high, its short-petioled leaves mostly trifoliolate, the crenate leaflets 1½′ long or less, its fragrant white flowers about 1′ broad, in cymes or solitary, its fruit a red, few-seeded oval berry about ½′ long. [*Limonia trifolia* Burm. f.; *T. Aurantiola* Lour.; *Limonia crenulata* of Jones.]

Chàlcas exótica (L.) Millsp., MARTINIQUE LAUREL, Asiatic, a shrub with small pinnate dark green leaves of about 5 entire leaflets, small white corymbose fragrant flowers with five petals and ten stamens, the fruit a small berry, is commonly planted for ornament. [*Murraya exotica* L.]

Rùta gravèolens L., GARDEN RUE, European, occasional in gardens, is an odorous herb 1°–3° high, with biternately divided, glandular-punctate leaves, and small yellowish flowers in terminal panicled cymes, the sepals and petals 4 or 5, the fruit 4-lobed or 5-lobed capsules about 5″ broad.

Clausena excavàta Burm., WAMPEE, East Indian, a tree, with pinnate, pubescent leaves of 15–30 ovate, oblique leaflets, small panicled 4-parted flowers, the berry-like, oblong fruit about 8″ long, is recorded by Lefroy and by Reade as seen by them in a few gardens. [*Cookia punctata* Retz.]

Chloroxylon Chloróxylon (Roxb.) Britton, SATINWOOD, East Indian, a tree with pinnate leaves 7′–10′ long, of 11–21 small short-stalked, obliquely oblong entire punctate leaflets, and small pedicelled flowers in large terminal clusters, the fruit oblong large capsules, is recorded by Lefroy as introduced at Mt. Langton. [*Swietenia Chloroxylon* Roxb.; *Chloroxylon Swietenia* DC.]

Glycosmis pentaphýlla (Retz.) DC., GLYCOSMIS, East Indian, a shrub 4°–9° high with thin 1–3-foliolate oblong-lanceolate to ovate leaves 3½′–8′ long, small white axillary flowers in short panicles, the petals 4 or 5, the stamens 8 or 10, the berries whitish or pink, about 5″ in diameter, is grown in a few gardens. [*Limonia pentaphylla* Retz.; *G. citrifolia* Lindl.]

Spathelia simplex L., PRIDE-OF-THE-MOUNTAIN, Jamaican, is a remarkable tree with slender unbranched trunk up to 50° high scarred by the bases of fallen leaves, the large pinnate finely velvety leaves up to 3° long, clustered

at the top, with 45–81 sessile lanceolate or oblong-lanceolate, acuminate crenate leaflets; at maturity a very large terminal panicle of showy purple flowers appears above the leaves, the petals about 3″ long, and the 3-winged fruits are about 1′ long. The tree dies after ripening its fruit. It has been planted in Bermuda.

Correa álba Andr., WHITE CORREA, Australian, taken to Mount Langton from the New York Botanical Garden in 1913, is a shrub with opposite, simple, ovate leaves, pubescent beneath, blunt at the apex, 1′–2′ long, and white flowers about 10″ broad, clustered mostly in 4's at the ends of branches, the fruit a leathery capsule.

Diosma vulgàris Schl., COMMON DIOSMA, South African, taken to Mt. Langton from the same source in 1913, is a low shrub, 1°–2° high, with linear, convex acuminate leaves 1′ long or less, and small white corymbose flowers.

Family 9. **SURIANÀCEAE** Lindl.

SURIANA FAMILY.

Shrubs of tropical coasts. Leaves alternate, narrow, rather fleshy. Flowers perfect, solitary, or in few-flowered terminal clusters. Calyx of 5 persistent sepals. Corolla of 5 imbricated petals with claws. Stamens 10; filaments slender, those opposite the petals shorter, or sometimes obsolete. Disk adnate to the base of the calyx or obsolete. Carpels 5, distinct, opposite the petals, pubescent, 1-celled; styles filiform; stigmas capitate. Ovules 2, collateral, ascending, campylotropous. Fruit achene-like. Seeds with a horseshoe-shaped embryo and thick incumbent cotyledons. Only the following monotypic genus.

1. **SURIÀNA** L.

Characters of the family. [Dedicated to Joseph Donat Surian of Marseilles.]



1. Suriana marítima L. TASSEL PLANT. (Fig. 224.) A branched shrub 3°–8° tall, rarely a small tree, with softly pubescent foliage. Leaves numerous and approximate, linear-spatulate, ½′–2′ long, entire, nerveless; flower-clusters not surpassing the leaves; sepals ovate, 3″–4″ long, acuminate; petals yellow, broadened upward, about as long as the sepals; fruit 4″–5″ broad, the achene-like carpels finely pubescent.

Common on beaches and coastal rocks. Native. Florida and the West Indies. Flowers in spring and summer. Bermuda is the type locality for this species, one of the most characteristic coastal plants, sometimes growing in large colonies.

Family 10. **SIMAROUBÀCEAE** DC.

AILANTHUS FAMILY.

Trees or shrubs, with bitter bark, and mainly alternate and pinnate, not punctate leaves. Stipules minute or none. Inflorescence axillary, paniculate or racemose. Flowers regular, dioecious or polygamous. Calyx 3–5-lobed or divided. Petals 3–5. Disk annular or elongated, entire or lobed. Stamens of the same number as the petals, or twice as many; anthers 2-celled. Ovaries 2–5, or single and 2–5-lobed, 1–5-celled; styles 1–5. Seeds generally solitary in the cavities. About 30 genera and 150 species, natives of warm or tropical regions. There are no native nor naturalized species of this family in Bermuda.

Ailanthus glandulòsa Desf., AILANTHUS, TREE OF HEAVEN, a large smooth-barked tree, with odd-pinnate deciduous leaves, the leaflets ovate or ovate-lanceolate, the small greenish dioecious flowers in large panicles followed, on the pistillate tree, by clusters of narrow samaras, is commonly planted for shade and ornament.

Quassia amàra L., BITTERWOOD, South American, a large tree with very bitter wood, pinnate leaves with a winged rachis, and large red flowers in terminal clusters, was grown at Mount Langton, prior to 1879, but its subsequent disappearance is recorded by H. B. Small.

Family 11. **MELIÀCEAE** Vent.

MAHOGANY FAMILY.

Shrubs, trees, or sometimes shrubby herbs. Leaves alternate, without stipules, pinnately compound, sometimes thrice pinnate. Inflorescence paniculate. Flowers perfect or polygamo-dioecious, regular. Calyx of 3–5 imbricated or rarely valvate sepals. Corolla of 3–5 distinct or somewhat united petals which are sometimes adnate to the stamen-tube. Stamens 8–10, or rarely fewer or more, inserted at the base of the disk, filaments united into a tube; anthers sessile or stalked. Carpels 3–5, united; ovary 3–5-celled, free; styles united. Ovules 2–many in each cavity, anatropous. Fruit a berry, capsule or drupe. Seeds sometimes winged; endosperm wanting or fleshy; embryo with leafy cotyledons. About 50 genera, including some 700 species, mostly tropical.

1. **MÈLIA** L.

Trees, commonly with variegated wood and scarred branches. Leaves alternate, unequally pinnate, often thrice compound, the leaflets often numerous, the blades toothed. Flowers perfect, white or purple, in ample axillary much-branched panicles. Sepals 5–6, imbricated. Disk annular. Petals 5–6, distinct, narrow, contorted, spreading. Staminal tube nearly cylindric, dilated at the mouth, 10–12-lobed, each lobe 2- or 3-cleft; anthers 10–12, erect. Ovary subglobose, 3–6-celled; stigma 3–6-lobed. Ovules 2 in each cavity, pendulous, one above the other. Drupe leathery-fleshy, with a 1–5-celled stone. Seed solitary in each cavity, wingless; endosperm fleshy or very thick. [Greek, from the similarity of the leaves to those of an Ash.] About 25 species, natives of Asia, the following typical.

1. Melia Azédarach L. PRIDE OF INDIA. CHINA TREE. (Fig. 225.) A large ornamental tree, reaching a height of 45° and sometimes with a trunk diameter of nearly 6°, its branches spreading. Bark furrowed; leaves twice compound, 1°–3° long, petioled; leaflets numerous, the blades ovate, oval or elliptic, 1′–3′ long, acute or short-acuminate, incised-serrate or lobed, acute or subcordate at the base; panicles long, open, about as long as the peduncles; pedicels 2″–5″ long; sepals elliptic or oblong-lanceolate, acute; petals purplish, narrowly oblong or oblanceolate, about 5″ long, obtuse, spreading; drupes subglobose, 7″–10″ in diameter, yellow, smooth; seeds lobed, very rough, wingless.



Common along roads and on hillsides.
Naturalized. Native of Asia. Widely naturalized in the southern United States and the West Indies. Flowers in spring and summer. The tree loses its leaves for some weeks during the winter; though some individuals remain leafy much longer than others. It is recorded as introduced into Bermuda about 1780.

Swietenia Mahàgoni L., MAHOGANY, Floridian and West Indian, is a large evergreen tree with bark separating in large thin scales, its pinnate leaves composed of from 4 to 8 ovate or ovate-lanceolate, acuminate, inequilateral leathery leaflets; the small flowers are panicled; the fruit is a large woody capsule, 5-valved from the base, with a woody axis. A few fine trees exist in Bermuda, the old one at the Flatt's being one of the most elegant individuals to be seen anywhere.

Swietenia macrophỳlla King, BROAD-LEAVED MAHOGANY, of Honduras, recently introduced, has much larger leaves, the leaflets up to 6′ long, rather thin, long-pointed; no trees have flowered as yet in Bermuda. In Porto Rico it is of more rapid growth than the true Mahogany.

Cedrela odcràta L., SPANISH CEDAR, West Indian, a tall tree, with nearly smooth bark, pinnate leaves with 10–20 pairs of oblong-lanceolate entire acuminate short-stalked leaflets 5′–7′ long, the small, yellowish flowers in large terminal panicles, the woody capsules splitting from the top, has been planted for shade and ornament. An elegant tree, about 40° high, in the Public Garden, St. George's, had not flowered up to the spring of 1914.

Family 12. **EUPHORBIÀCEAE** J. St. Hil.

SPURGE FAMILY.

Monoecious or dioecious herbs, shrubs or trees, with acrid often milky sap. Leaves opposite, alternate or verticillate. Flowers sometimes much reduced and subtended by an involucre which somewhat resembles a calyx, the number of parts in the floral whorls often different in the staminate and pistillate flowers. Ovary usually 3-celled; ovules 1 or 2 in each cavity, pendulous; styles mostly 3, simple, divided, or many-cleft. Fruit a mostly 3-lobed capsule, separating, often elastically, into 3 2-valved

carpels from a persistent axis. Seeds anatropous; embryo in fleshy or oily endosperm, the broad cotyledons almost filling the seed-coats. About 250 genera and over 4000 species, of wide distribution.

Flowers not in an involucre; sepals several.
  Ovules 2 in each ovary-cavity. 1. *Phyllanthus.*
  Ovule 1 in each ovary-cavity.
    Plants stellate-pubescent. 2. *Croton.*
    Plants with simple hairs, or glabrous.
      Flowers spicate, the pistillate basal, or plants completely dioecious.
        Sepals partially united. 3. *Acalypha.*
        Sepals 3, distinct. 4. *Mercurialis*
      Flowers racemose or panicled, the pistillate ones terminal, or inflorescence cymose.
        Leaves peltate; flowers racemose. 5. *Ricinus.*
        Leaves not peltate.
          Flowers cymose. 6. *Jatropha.*
          Flowers racemose or panicled. 7. *Manihot.*
Flowers in an involucre; sepal 1, a mere scale.
  Involucre regular or nearly so.
    Glands of the involucre with petal-like appendages. 8. *Chamaesyce.*
    Glands of the involucre without appendages.
      Inflorescence of cymes in a terminal umbel; stipules wanting. 9. *Tithymalus.*
      Cymes clustered; stipules gland-like. 10. *Poinsettia.*
  Involucre irregular, oblique. 11. *Pedilanthus.*

1. PHYLLÁNTHUS L.

Annual or biennial herbs (some tropical species shrubs or trees). Leaves alternate, entire, often so arranged as to appear like the leaflets of a compound leaf. Flowers monoecious, apetalous, a staminate and a pistillate one together in the axils. Calyx mostly 5–6-parted, the lobes imbricated. Stamens usually 3. Ovules 2 in each cavity; styles 3, each 2-cleft. [Greek, leaf-flower, the blossoms in some species being seated on leaf-like flattened branches.] More than 400 species, natives of the tropical and temperate zones of both hemispheres. Type species: *Phyllanthus Niruri* L.



1. Phyllanthus Nirùri L. NIRURI. (Fig. 226.) Annual, glabrous, Stems erect or ascending, 4′–12′ tall, the branches spreading or recurving; leaves alternate, small, thin, oblong or slightly broadest above the middle, 1½″–5″ long, obtuse, short-petioled, approximate on the branchlets; pedicels about ½″ long; sepals orbicular or oval, barely 1″ long, the outer ones orbicular, all abruptly pointed; capsules 3-lobed, about 1″ broad, smooth; seeds about ½″ long.

Common in waste and cultivated grounds. Naturalized. Native in Florida, the West Indies and tropical continental America. Old World tropics. Flowers nearly throughout the year.

Phyllanthus Émblica L.. EMBLIC MYROBOLAN, of eastern Asia, a handsome specimen of which was seen in the Public Garden, St. George's, in 1913, is a small tree, with slender branches, bearing numerous 2-ranked, linear, light-green leaves 7″–9″ long, 1½″ wide; the minute, greenish flowers are borne sessile in the axils and followed by globose, somewhat fleshy fruits 5″–8″ in diameter. The 2-ranked leaves give the foliage the aspect of being pinnately compound. In India the bark and leaves are used in tanning and also furnish a brown-black dye; the fruit is used as a purgative medicine and in cooling drinks.

2. CRÒTON L.

Herbs or shrubs, strong-scented, stellate-pubescent. Leaves mostly alternate, sometimes with 2 glands at the base of the blade. Flowers often spicate or racemose. Staminate flowers uppermost; calyx 4–6-parted (usually 5-parted); petals usually present, but small or rudimentary, alternating with glands; stamens 5 or more. Pistillate flowers below the staminate; calyx 5–10-parted; petals usually wanting; ovary mostly 3-celled; ovule 1 in each cavity; styles once, twice or many times 2-cleft. [The Greek name of the Castor-oil plant.] About 700 species, mostly of warm and tropical regions, a few in the temperate zones. Type species: *Croton Tiglium* L.

Perennial, shrubby; petals none. 1. *C. punctatus.*
Annual, herbaceous; petals present in the staminate flowers. 2. *C. monanthogynus.*

1. Croton punctàtus Jacq. BEACH CROTON. (Fig. 227.) Perennial, 1½°–3° tall, the branches gray or rusty tomentose. Leaves elliptic, oblong or ovate, ½′–2′ long, entire or merely undulate, truncate or cordate at the base, pale or whitish, puberulent above, densely scaly-tomentose beneath; racemes few-flowered; flowers monoecious or dioecious; staminate in racemes ½′–1′ long, short-pedicelled; sepals 5–6, triangular, nearly equal; petals wanting or rudimentary; stamens normally 12; filaments pubescent; pistillate flowers 1–3 in a raceme; sepals 5, equal, oblong or cuneate; petals wanting; ovary 3-celled; capsules subglobose, depressed, 2½″–4″ long; seeds about 3″ long.



Sand dunes and sea beaches, frequent. Native. Coast of the southeastern United States, Cuba and Central America. Presumably transported to Bermuda through the ocean. It is locally abundant along the south shore. Flowers from spring to autumn. [*C. maritimus* Walt.]



2. Croton monanthógynus Michx. SINGLE-FRUITED CROTON. (Fig. 228.) Main stem slender, 4′–10′ high, topped by a 3–5-rayed leafy umbel with rays forked or umbellately branched; leaves ovate or oblong, ½′–1½′ long; staminate flowers clustered at the ends of erect peduncles, with 3–5 unequal calyx-segments, the same number of petals and scale-like glands, and 3–8 stamens; pistillate flowers mostly solitary, on recurved pedicels, with 5 equal calyx-segments, no petals, and 5 glands; capsule ovoid or oblong-ovoid, 2″–2½″ long; seeds oval or orbicular, variegated, minutely pitted, shining.

Abundant in cultivated land, Cooper's Island, 1912. Introduced. Native of the southeastern United States. Flowers in summer and autumn.

Croton díscolor Willd., YELLOWISH CROTON, West Indian, mentioned by Jones in 1873, and said by Reade in 1883 to have been introduced on account of its ornamental foliage, is a stellate-pubescent shrub 3°–6° high, with oblong leaves about 1′ long, yellowish beneath, its flowers spicate, its small depressed-globose capsules rough.

The ornamental garden Crotons belong to the genus *Codiaeum* especially to *Codiaeum variegatum.* (See p. 219.)

3. ACALÝPHA L.

Herbs or shrubs. Stems mostly erect. Leaves alternate, stipulate. Flowers in spikes or spike-like racemes, the staminate cluster peduncled, each flower in the axil of a minute bractlet, with a 4-parted calyx and 8–16 stamens united at their bases. Pistillate flowers subtended by a foliaceous bract, which often equals or overtops the staminate, the calyx 3–5-parted; stigmas fringed or lacerate; petals wanting in both kinds of flowers; capsule usually of 3 2-valved carpels, each 1-seeded. [Greek, nettle.] About 250 species, mostly tropical and subtropical. Type species: *Acalypha virginica* L.

Acalypha híspida Burm. f., CHENILE PLANT, PHILIPPINE MEDUSA PLANT, East Indian, a shrub with ovate, toothed leaves, the red drooping spikes often 10′ long, is planted for ornament.

1. Acalypha Wilkesiàna Muell. Arg. MATCH-ME-IF-YOU-CAN. JACOB'S COAT. (Fig. 229.) A shrub, up to 8° high, the twigs appressed-pubescent. Leaves ovate to ovate-oblong, long-petioled, 4′–8′ long, acuminate at the apex, rounded or subcordate at the base, finely bluntly dentate, nearly glabrous; variously colored; staminate spikes slender, nearly as long as the upper leaves, the pistillate shorter, their bracts broadly triangular, deeply incised.



Sparingly escaped into waste grounds from hedges and gardens where it is commonly planted for its ornamental foliage. Native of the Fiji Islands. [*A. tricolor* of Lefroy and of H. B. Small?; *Coleus scutellarioides* of A. H. Moore.]

4. MERCURIALIS [Tourn.] L.

Annual or perennial herbs or shrubby plants. Leaves opposite, entire or often toothed. Flowers mostly dioecious, apetalous. Staminate flowers in more or less elongated spikes or racemes, the calyx membranous, of 3 valvate sepals; stamens 8–20; filaments distinct; anthers opening lengthwise. Pistillate flowers with 3 sepals; ovary 2-celled; styles 2, distinct or nearly so; stigmas entire. Ovules solitary in each cavity. Capsule usually 2-lobed. Seed solitary in each cavity, with a smooth or tuberculate crustaceous testa. [The herb of Mercury.] About 7 species, the following typical, all natives of the Old World.



1. Mercurialis ánnua L. HERB MERCURY. MOCKERY. STINKWEED. (Fig. 230.) Annual, glabrous. Stems 8′–2° tall, more or less branched; leaf-blades thinnish, ovate to lanceolate, acute or slightly acuminate, serrate with rounded teeth, or crenate; petioles 3″–8″ long; staminate flowers in interrupted spikes which surpass the leaves; pistillate flowers clustered in the axils; capsules 2-lobed, 2″–2½″ broad, hispid; seeds subglobose, ⅛″ in diameter, pitted.

Common in waste and cultivated grounds. Naturalized. Native of Europe. Naturalized in the southern United States. Flowers nearly throughout the year.

5. RÍCINUS L.

A tall stout monoecious plant, somewhat woody, glabrous and glaucous, with alternate large peltate palmately lobed leaves, and numerous small apetalous greenish flowers in terminal racemes, the pistillate above the staminate. Staminate flowers with a 3–5-parted calyx, the segments valvate, and numerous crowded stamens; filaments repeatedly branched. Pistillate flowers with a caducous calyx. Capsule subglobose, or oval, separating into 3 2-valved carpels. Endosperm fleshy and oily. [The Latin name of the plant.] A monotypic genus of the warmer parts of Africa and Asia.



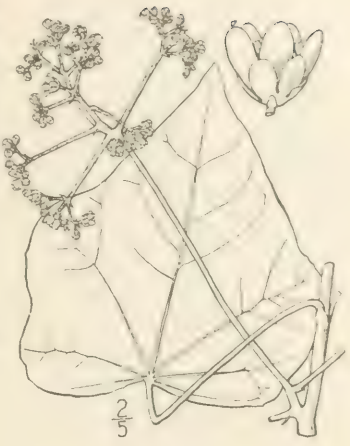
1. Ricinus commûnis L. CASTOR-OIL PLANT. CASTOR-BEAN. PALMA CHRISTI. (Fig. 231.) Stem erect, up to 18° tall, more or less branched, becoming tree-like in warm regions. Leaves nearly orbicular in outline, 1°–2° broad, 6–11-palmately lobed and peltate, the lobes toothed, acute or acuminate; capsule 6″–9″ in diameter, usually spiny; seeds shining, smooth, black, variegated with white, or mottled with gray and brown markings.

In waste places, frequent. Naturalized. Native of tropical regions. Widely naturalized in the southern United States and the West Indies. Flowers nearly throughout the year.

6. JÁTROPHA L.

Monoecious or rarely dioecious perennial herbs, or shrubs, with entire, lobed or divided leaves, the flowers in cymes. Staminate flowers on the upper parts of the cymes, with a corolla-like 5-lobed calyx, 5 petals distinct or united or none, the stamens usually numerous (5–30). Pistillate flowers in the lower forks of the cymes; capsule ovoid or subglobose, separating into 2-valved carpels. [Greek, healing nutriment.] About 25 species, widely distributed in warm and temperate regions. Type species: *Jatropha urens* L.

1. Jatropha Cùrcas L. PHYSIC-NUT. (Fig. 232.) A tree, up to 15° high with a stout trunk sometimes 8′ in diameter, the branches glabrous, the young twigs somewhat pubescent. Leaves suborbicular in outline, long-petioled, 3′–6′ broad, cordate at base, sharply or bluntly 3–5-lobed, rarely entire, dark green, glabrous or somewhat puberulent; cymes terminal, mostly shorter than the leaves, stalked; bracts and pedicels pubescent, the calyx slightly hairy; petals coherent, greenish; fruit fleshy, about 1½′ long, tardily separating into 3 or 2 carpels; seeds oblong, about ¾′ long, purgative.



Collected by Lefroy about 1875 at Paynter's Vale and regarded by him as native there which seems improbable. West Indies and tropical continental America. Lefroy's specimen is preserved in the Kew herbarium. The plant has not been seen in Bermuda by recent collectors, though also mentioned as at Walsingham by H. B. Small. Flowers in summer.

Jatropha multìfida L., CORAL PLANT, CORAL BUSH, a shrub 4° or 5° high, with leaves very deeply cleft into 7–9 narrow laciniate segments, the scarlet umbellate flowers on coral-red stalks, is commonly cultivated in gardens for ornament, flowering in summer and autumn.

Jatropha podágrica Hook., GOUTY-STALKED JATROPHA, Central American, a species with a much swollen stem about 1° high, the large peltate leaves orbicular and lobed, the purplish flowers in flat cymes, the capsules ellipsoid, is recorded by Lefroy as introduced in 1875.

Jatropha hastàta Jacq., ROSE-FLOWERED JATROPHA, Cuban, a shrub about 5° high with irregularly lobed fiddle-shaped leaves and umbelled scarlet flowers, is occasionally grown in gardens. [*J. panduraefolia* Andr.]

7. MÁNIHOT Adans.

Vigorous monoecious herbs or shrubs, commonly with glaucous and glabrous foliage. Leaves alternate, entire or palmately 3–7-lobed or 3–7-parted, the segments entire or lobed. Flowers apetalous, in racemes or panicles, the staminate with a calyx of 5 partially united sepals. Stamens 10, in 2 series; filaments slender, those of the inner series attached to the lobes of the disk, the anthers opening lengthwise. Pistillate flowers with a calyx similar to that of the staminate but the tube often shorter. Ovary 3-celled; styles 3, slightly united at the base. Ovules solitary in each cavity. Capsule 3-celled. Seeds solitary in each cavity. [South American name.] About 80 species, natives of South America, the following typical.



1. **Manihot Mánihot** (L.) Cockerell. CASSAVA. (Fig. 233.) Stems 3°–5° tall, more or less branched. Leaves 3–7-parted, the segments linear to elliptic, or slightly broadest above the middle, acute or acuminate, entire; petioles about as long as the blades or longer; panicles spreading; bracts shorter than the pedicels; calyx campanulate, 3″–4″ high, its lobes ovate, obtuse, about as long as the tube; calyx of the pistillate flowers with a shorter tube than that of the staminate; fruit subglobose, about 10″ in diameter. [*Jatropha Manihot* L.; *M. utilissima* Pohl.]

Spontaneous after cultivation. Native of South America. Widely cultivated and more or less spontaneous in Florida and the West Indies. Its large tubers contain much starch, the tapioca of commerce, an important food-product prepared by grinding, washing and baking. The plant is propagated by cuttings and is much planted for food.

8. CHAMAESŸCE S. F. Gray.

Annual or perennial herbs or shrubs. Stems often branched at the base, the branches ascending or prostrate, forking. Leaves opposite, more or less oblique at the base; stipules entire or fringed. Involucres solitary in the axils or in axillary cymes; glands 4, naked or usually with an appendage, one sinus of each involucre glandless. Capsule sometimes pubescent, the angles sharp or rounded. Seeds angled, white, grey, red or black, the faces smooth or transversely wrinkled. [Greek, ground-fig.] About 225 species, widely distributed. Locally known as Tittimelly. Most of the species are low and inconspicuous plants and several form weeds of cultivation. Type species: *Chamaesyce maritima* S. F. Gray.

Leaves entire, fleshy.	1. *C. buxifolia.*
Leaves dentate, not fleshy.	
Capsules glabrous.	
Leaves 5″ long or less, sparingly low-crenate.	2. *C. Blodgettii.*
Leaves larger, up to 1½′ long, dentate or denticulate.	
Leaves red-blotched.	3. *C. Preslii.*
Leaves not red-blotched.	
Leaves ovate-oblong.	4. *C. hypericifolia.*
Leaves linear-oblong to oblong-lanceolate.	5. *C. hyssopifolia.*
Capsules pubescent.	
Involucres axillary, mostly solitary.	
Capsules pubescent on the angles.	6. *C. prostrata.*
Capsules pubescent all over.	7. *C. maculata.*
Involucres in peduncled cymes.	8. *C. hirta.*

1. Chamaesyce buxifòlia (Lam.) J. K. Small. COAST SPURGE. (Fig. 234.) Perennial, glabrous, somewhat fleshy. Stems erect or decumbent, 8′–2° long, branching, leafy, with long or short internodes; leaf-blades ovate to broadly oblong or cuneate near the base of the stem, rather fleshy, 4″–6″ long, obtuse or acutish, involute, rounded or subcordate, nearly sessile; involucres campanulate, about ¾″ high, as long as the peduncles or shorter; glands transversely oblong; appendages consisting of mere whitish borders; capsules 1½″ broad, glabrous, the angles sharp; seeds globose-ovoid. [*Euphorbia buxifolia* Lam.]

Common on sea beaches and coastal rocks, rarely occurring on rocks inland, as on Abbot's Cliff. Native. Florida and the West Indies. Flowers nearly throughout the year.





2. Chamaesyce Blodgéttii (Engelm.) J. K. Small. BLODGETT'S SPURGE. (Fig. 235.) Glabrous or nearly so, branched at the base, the branches few or numerous, 4′–16′ long, usually prostrate; leaves oblong or nearly so, 1½″–5″ long, minutely crenate near the apex, oblique at the base, manifestly petioled; involucres campanulate, less than ½″ high, short-peduncled; glands minute, elevated; appendages irregular, white or slightly colored; capsules ¾″ high, about as broad, glabrous, the angles rather sharp; seeds about ½″ long, gray, 4-angled, the faces faintly transversely wrinkled. [*Euphorbia Blodgettii* Engelm.; *E. bermudiana* Millsp.]

Common in rocky and sandy soil. Native. Florida, Bahamas, Cuba, Jamaica. Flowers nearly throughout the year. This, like other usually prostrate species of the genus, sometimes has ascending or nearly erect stems.



3. Chamaesyce Prèslii (Guss.) Arthur. LARGE OR UPRIGHT SPOTTED SPURGE. (Fig. 236.) Stem 8′–2° high, the branches mostly spreading; leaves opposite, oblong, or linear-oblong, varying to ovate or obovate, often falcate, oblique, 3-nerved, unequally serrate, often with a red blotch and red margins; involucres narrowly obovoid, ½″ long, bearing 4 glands subtended by orbicular or reniform white or red appendages; capsule glabrous, 1″ in diameter; seeds oblong-ovoid, black, 4-angled, with broken transverse ridges. [*Euphorbia Preslii* Guss.]

Roadsides, Walsingham, 1912. Naturalized. Native of continental North America. Flowers in autumn. [?*Euphorbia hypericifolia hirsuta* of Reade.]

4. Chamaesyce hypericifòlia (L.) Millsp. HYPERICUM-LEAVED SPURGE. (Fig. 237.) Annual, branched, erect, 2° high or less. Leaves oblong or oblong-lanceolate, 7″–15″ long, obtuse at the apex, oblique at the base, sharply serrate above the middle, glabrous or somewhat pubescent; stipules ovate, dentate; cymes peduncled in the axils, rather densely flowered; involucre turbinate, glabrous without, its lobes triangular-lanceolate, lacerate; glands roundish; appendages white, nearly orbicular; capsule glabrous, its lobes keeled; seeds red, ovoid, their faces transversely rugose. [*Euphorbia hypericifolia* L.]

Common in waste and cultivated ground. Naturalized. Native in the southern United States, West Indies and continental tropical America. Flowers nearly throughout the year. This is one of the abundant weeds of cultivation, neglected fields sometimes being overrun by it.



5. Chamaesyce hyssopifòlia (L.) J. K. Small. HYSSOP-LEAVED SPURGE. (Fig. 238.) Annual, perhaps sometimes of longer duration, erect, ascending, or spreading, branched, 1½° high or less, the branches very slender. Leaves oblong or linear-oblong, 6″–12″ long, serrate, pubescent or glabrate, obtuse at both ends, inequilateral; cymes rather loosely few-flowered, filiform-peduncled; involucre glabrous without and within, its lobes triangular, mostly entire; glands very small, stalked; capsule glabrous; seeds ovoid, black, their faces transversely ridged. [*Euphorbia hyssopifolia* L.]

Frequent in waste and cultivated ground. Naturalized. Native in Florida, the West Indies and tropical continental America. Flowers from spring to autumn.





6. Chamaesyce prostràta (Ait.) J. K. Small. PROSTRATE SPURGE. (Fig. 239.) Annual, more or less pubescent, or glabrate, purplish. Stems branched at the base, the branches prostrate, 2′–8′ long, forking, commonly very leafy; leaf-blades oval, obovate or oblong, often a little broadest above the middle, 2″–3″ long, obtuse, sparingly serrulate at the apex, oblique at the base, manifestly petioled; involucres turbinate, about ¼″ high; glands minute; appendages narrow; capsules ½″ high, somewhat broader, pubescent along the angles; seeds less than ½″ long, transversely wrinkled. [*Euphorbia prostrata* Ait.]

Common in paths, in waste and cultivated grounds. Naturalized. Native of the southern United States, the West Indies, continental tropical America and in the Old World tropics. Flowers nearly throughout the year.



7. Chamaesyce maculàta (L.) J. K. Small. SPOTTED OR BLOTCHED SPURGE. (Fig. 240.) Green, puberulent or pilose. Branches slender, radiately prostrate, 2′–16′ long, often dark red; leaves usually blotched, oblong or ovate-oblong, 2″–8″ long, obtuse, more or less serrate, the base oblique, subcordate; involucres solitary in the axils, 1″ long, with 4 cup-shaped glands, the appendages narrow, white or red; capsule ovoid-globose, about 1″ in diameter, pubescent; seeds ovoid-oblong, obtusely angled, minutely pitted and transversely wrinkled. [*Euphorbia maculata* L.]

Common in waste and cultivated grounds. Naturalized. Native of continental North America. Flowers from spring to autumn.



8. Chamaesyce hirta (L.) Millsp. HAIRY SPURGE. (Fig. 241.) Annual, pubescent; stems slender, branched, 3′–15′ long, the branches diffuse, ascending or prostrate. Leaves oblong to ovate-lanceolate, obliquely inequilateral, short-petioled, 4″–12″ long, acute, serrate, usually blotched; involucres in rather dense subglobose, stalked, terminal and axillary clusters shorter than the leaves; glands very small, their appendages obsolete; capsule pubescent, 3-lobed, about ½′ high; seeds bluntly angled, their faces faintly wrinkled transversely. [*Euphorbia hirta* L.; *Euphorbia pilulifera* L.]

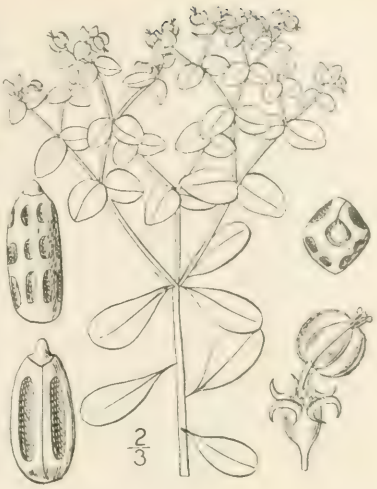
Common in cultivated ground. Naturalized. Native of the West Indies and tropical continental America. Flowers from spring to autumn.

9. **TITHYMÀLUS** [Tourn.] Adans.

Annual or perennial herbs or shrubby plants, with simple or branched stems, topped by several-rayed cyme-like umbels. Leaves below the umbel usually scattered or alternate, without stipules, often broadened upward. Bracts of the umbel quite different from the stem-leaves, entire or toothed. Involucres sessile or pedunculed, axillary, disposed in cymes, their lobes often toothed. Glands 4, transversely oblong, reniform or crescent-shaped by the horn-like appendages, the fifth one represented by a thin often ciliate lobe. Capsule exserted, smooth or tuberculate, its lobes rounded, sharp or keeled. Seeds variously pitted, often with caruncles. [Greek, referring to the milky juice of these plants.] About 250 species, widely distributed. Type species: *Euphorbia dendroides* L.

1. Tithymalus Péplus (L.) Hill. PETTY SPURGE. (Fig. 242.) Annual, bright green, glabrous. Stem erect or assurgent, 4′–12′ tall, simple or branched from the base or above and topped by a 3–5-rayed umbel; leaves alternate, oblong or obovate, ½′–1½′ long, obtuse or retuse, entire, more or less crisped, narrowed into slender petioles; bracts of the rays opposite, ovate or triangular-ovate, minutely apiculate, sessile; involucres campanulate, almost sessile in the axils of the bracts, about ¼″ high, bearing 4 crescent-shaped glands produced into subulate horns; capsules globose-ovoid, 1″–1½″ in diameter, smooth, the 3 lobes 2-keeled on the back; seeds ¾″ long, whitish, marked with 1–4 series of pits. [*Euphorbia Peplus* L.]

Common in waste and cultivated ground. Naturalized. Native of Europe. Naturalized in North America. Flowers from spring to autumn.



10. POINSÉTTIA Graham.

Annual or perennial herbs or shrubby plants, with green or partially highly colored foliage. Stems simple or branched. Leaves alternate below, opposite above, similar throughout or very various, the stipules gland-like. Involucres in axillary or terminal cymes or solitary, their lobes fimbriate. Glands fleshy, solitary, or rarely 3 or 4, sessile or short-stalked, without appendages, the missing ones represented by narrow lobes. Capsule exserted, the lobes rounded. Seed narrowed upward, tuberculate. [In honor of Joel Roberts Poinsette of South Carolina.] About 12 species mostly of tropical America. Type species: *Poinsettia pulcherrima* (Willd.) Graham.



Perennial; native. 1. *P. heterophylla.*
Annual weed. 2. *P. cuathophora.*

1. Poinsettia heterophýlla (L.) Kl. & Garcke. VARIOUS-LEAVED SPURGE. JOSEPH'S COAT. (Fig. 243.) Perennial, bright green. Stem 1°–4° tall, slender, nearly solid, the branches ascending, or the lower spreading, leafy at the ends; leaves alternate, very variable, linear to nearly orbicular, entire, undulate, sinuate or dentate, the uppermost often fiddle-shaped and blotched with red and white; involucres clustered at the ends of branches, 1½″ long; lobes 5, ovate or oblong, laciniate, the sinuses bearing 1 or several sessile glands; capsule glabrous or minutely pubescent, 3″ in diameter; seeds transversely wrinkled and tuberculate. [*Euphorbia heterophylla* L.]

Frequent on rocky banks, [illegible] hillsides, sometimes invading cultivated grounds. Native Southern United States, West Indies and tropical mainland America. Flowers nearly throughout the year.



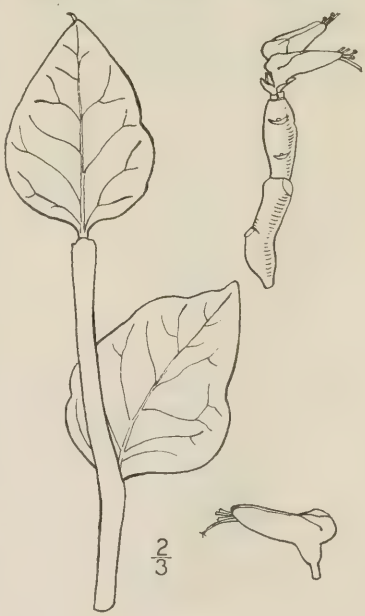
2. **Poinsettia cyathóphora** (Murr.) S. Brown. ANNUAL POINSETTIA. (Fig. 244.) Annual, herbaceous, 2½° high or less, pubescent. Stem stout, hollow, simple, or branched. Leaves clustered at the ends of the stem and branches, ovate to obovate in outline, coarsely angulately few-toothed, acute or acuminate, green, or the upper with whitish bases; involucres in dense, broad, terminal clusters; capsule-valves with elevated margins. [*Euphorbia cyathophora* Murr.]

Common in cultivated ground. Naturalized. Native of tropical America.

Poinsettia pulchérrima (Willd.) Graham, GARDEN POINSETTIA, Mexican, a shrub up to 10° high, with thin ovate lobed or entire, slender-petioled, acute leaves 4′–8′ long, and small, yellowish-green, clustered flowers, subtended by large, lanceolate, bright vermilion-red bracts 2′–4′ long, is widely planted for ornament, growing readily from cuttings, and flowering in the winter. [*Euphorbia pulcherrima* Willd.]

11. PEDILÁNTHUS [Mill.] Neck.

Fleshy shrub-like plants, with copious milky sap, alternate entire leaves and very irregular oblique involucres in terminal forking cymes. Involucre 2-lipped, the lower lip longer than the upper, enclosing several staminate flowers and 1 pistillate; staminate flowers of a single stamen; pistillate flower stalked, the style slender, bearing 3 stigmas. Capsule splitting into 3 segments. [Greek, slipper-flower.] About 30 species. Type species: *Euphorbia tithymaloides* L.



1. **Pedilanthus latifòlius** Millsp. & Britton. SLIPPER-PLANT. FIDDLE-FLOWER. (Fig. 245.) Erect, glabrous, usually much branched, 4°–6° high, the branches zigzag. Leaves ovate, 1′–2½′ long, acute at the apex, obtuse or subcordate at the base, the midrib not flanged beneath, the petioles very short; involucres several or numerous, salmon-colored, about 6″ long, on slender pedicels 2″–3″ long, glabrous.

Hillside on Castle Point. Naturalized, 1912. Commonly cultivated in gardens for interest. Original habitat unknown; grown in gardens in Florida and the West Indies. Flowers in summer and autumn.

Pedilanthus tithymaloïdes (L.) Poit., SLIPPER-FLOWER, of tropical America, is similar to the preceding species, but has nearly straight stems, ovate-lanceolate, longer leaves with the midvein produced into a flange beneath. It has been recorded by several authors as grown in Bermuda, but all the plants seen here by me belong to *P. latifolius*.

Codiaeum variegàtum (L.) Blume, GARDEN CROTONS, shrubs with evergreen, variously colored and mottled leaves varying from linear to broadly ovate, entire or lobed, the small greenish flowers in long racemes, are grown in a great number of races for ornament and thrive luxuriantly. A very interesting bud-sport of a lanceolate-leaved branch on a linear-leaved race was observed at Harrington House in 1912. [*Croton variegatus* L.]

Euphorbia làctea Haw., MOTTLED CANDLESTICK TREE, East Indian, a fleshy, nearly leafless plant 6°–12° high, the spreading 3-angled branches whitish or yellowish-blotched, knobby, with a short double spine on the end of each knob, is grown for interest in many gardens. Its copious sap is bright white.

Euphorbia fùlgens Karwinsky, SCARLET PLUME, Mexican, recorded by Lefroy as introduced in 1874, is a slender shrub with long drooping unarmed branches, and lanceolate, long-petioled leaves, the scarlet-bracted involucres in axillary cymes.

Euphorbia splèndens Bojer, CROWN-OF-THORNS, Madagascan, a shrub with slender, vinelike branches, copiously armed with stout spines ½′–1′ long, the obovate or spatulate, thin leaves 3′ long or less, the involucres in terminal cymes, subtended by 2 bright-red, ovate, involucral bracts, is grown in gardens for ornament and interest.

Euphorbia Nivùlia Ham., LARGE TUBERCLED SPURGE, East Indian, a milky-sapped, fleshy plant 6° high or more with tubercled stems and branches, the tubercles in vertical rows, each tipped by 2 short spines, the oblanceolate, thick, obtuse, concave, short-petioled, bright green leaves 3′–6′ long, apparently veinless when fresh, the red sessile, staminate involucres solitary or few together above the tubercles and about 3″ broad, the pistillate 3 together, is occasionally planted for ornament and interest. The very old plant at Bishop's Lodge, from which cuttings were taken to the New York Botanical Garden in 1914, is this species, erroneously recorded by H. B. Small, Jones and Verrill as *Euphorbia Candelabrum*.

Synadenium Grántii Hook., GRANT'S SYNADENIUM, of tropical Africa, shown by a fine plant at the Public Garden, St. George's in 1913, is a fleshy, unarmed plant up to 10° high, with round stems and branches, the obovate or oblanceolate, short-petioled, pinnately veined, thick leaves 3′–5′ long, clustered at the ends of the branches; the small red involucres are in stalked terminal forked cymes.

Aleurites moluccàna (L.) Willd., OTAHEITE WALNUT, of the South Sea Islands, a rather large tree, with large broad petioled sharply 3-lobed leaves, puberulent panicles of small whitish monoecious flowers and fleshy 1–2-seeded fruits about 2′ thick, is occasionally grown on lawns and in gardens for ornament and interest, and has locally become abundant. Often called Butternut. [*Jatropha moluccana* L.; *A. triloba* Forst.]

Hura crépitans L., SANDBOX-TREE, West Indian, a large tree with long-petioled broadly ovate long-tipped leaves, the flattened round fruits 3 or 4 inches across, splitting violently and noisily into many thin dry crescent shaped carpels, is occasional in gardens. A fine old specimen may be seen in the Public Garden at St. George's where it forms the center-piece.

Triadica sebìfera (L.) J. K. Small, CHINESE TALLOW-TREE, Asiatic, a tree with thin slender-petioled, broadly ovate, short acuminate leaves, as wide as long or wider, small monoecious flowers without petals, in narrow panicles,

the fruit a fleshy capsule, is occasionally grown for interest. [*Croton sebiferum* L., *Stillingia sebifera* Baill.]

Cicca dísticha L. [*Phyllanthus distichus* (L.) Muell. Arg.], OTAHEITE GOOSEBERRY, of the Old World tropics, is a tree up to 40° high, with 2-ranked ovate leaves, appearing as if pinnate, and small imperfect flowers fascicled on the upper part of the trunk, its yellow fruits edible; an old large tree stood near the border of Pembroke Marsh at Mt. Langton in 1912.

Breynia nivòsa (W. G. Smith) J. K. Small, SNOW-BUSH, of the South Sea Islands, a shrub with oval green, white and pink variegated leaves, and small greenish flowers, is common in gardens. [*Phyllanthus nivosus* W. G. Smith.]

Excaecaria bícolor Hassk., CRIMSON-LEAVED EXCAECARIA, Javan, a shrub 4°–6° high, with opposite or ternately whorled, lanceolate acuminate crenulate, short-petioled leaves about 4′ long, green above, conspicuously crimson beneath, the small, greenish monoecious flowers axillary, the fruit a capsule about 4″ broad, is a beautiful and interesting plant, occasionally grown for ornament.

Bischofia trifoliàta (Roxb.) Hook., KAINFAL, East Indian, a timber-tree, with deciduous 3-foliolate, long-petioled, alternate leaves, the stalked serrulate, acuminate leaflets 4′–6′ long, the numerous minute greenish 5-parted flowers in axillary panicles shorter than the leaves, was shown at the Agricultural Station in 1915 by a fine tree about 20° high. [*Andrachne trifoliata* Roxb.; *B. javanica* Blume.]

Order 19. SAPINDÀLES.

Mostly trees or shrubs. Petals usually present and separate. Sepals mostly distinct. Stamens rarely more than twice as many as the sepals, when as many or fewer, opposite them. Ovary superior, compound. Ovules pendulous, with the raphe away from the axis of the ovary, or erect or ascending.

Ovary mostly 1-celled; plants with resin-bearing tissues.	1. ANACARDIACEAE.
Ovary 2 several-celled.	
Leaves simple, pinnately veined.	
Ovule 1 in each ovary-cavity.	2. ILICACEAE.
Ovules 2 or more in each ovary-cavity.	
Flowers with a disk and petals.	3. CELASTRACEAE.
Disk obsolete; corolla wanting.	4. DODONAEACEAE.
Leaves compound; fruit various.	
Flowers regular.	5. SAPINDACEAE.
Flowers irregular.	6. MELIANTHACEAE.

Family 1. ANACARDIÀCEAE Lindl.

SUMAC FAMILY.

Trees or shrubs, with acrid resinous or milky sap, alternate or rarely opposite leaves, and polygamo-dioecious or perfect, mainly regular flowers. Calyx 3–7-cleft. Petals of the same number, imbricated in the bud, or rarely none. Disk generally annular. Stamens as many or twice as many as the petals, rarely fewer, or more, inserted at the base of the disk; filaments separate; anthers commonly versatile. Ovary in the staminate flowers 1-celled. Ovary in the pistillate flowers 1– or sometimes 4–5-celled; styles 1–3; ovules 1 in each cavity. Fruit generally a small drupe. Seed-coat bony or crustaceous; endosperm little or none; cotyledons fleshy. About 60 genera and 500 species, most abundant in warm or tropical regions, a few extending into the temperate zones.

1. TOXICODÉNDRON [Tourn.] Mill.

Trees, shrubs, or vines, poisonous to the touch, with 3-foliolate or pinnate leaves, and axillary panicles of small greenish or white, polygamous flowers. Calyx 5-cleft. Petals and stamens 5. Ovary 1-ovuled. Drupes glabrous, or sparingly pubescent, the stone striate. [Greek, poison-tree.] About 20 species, of North America and Asia. Type species: *Rhus Toxicodendron* L.

1. Toxicodendron radicans (L.) Kuntze. POISON IVY. POISON OAK. (Fig. 246.) A woody vine, climbing by aerial rootlets, or shrubby. Leaves petioled; leaflets ovate or rhombic, 1′–4′ long, entire or sparingly dentate or sinuate, acute or short-acuminate, the lateral sessile or short-stalked, inequilateral, the terminal ones stalked; flowers green, 1½″ broad, in loose axillary panicles. [*Rhus radicans* L.; *Rhus Blodgettii* Kearney; *R. Toxicodendron* of Michaux, Jones, Reade, Lefroy, Hemsley and H. B. Small.]



Frequent on hillsides and on the borders of marshes. Native. Eastern United States. Flowers in spring and summer. This plant is the only wild species of Bermuda at all poisonous to the touch; many people are not affected by it, while others may be seriously inconvenienced.

Mangifera índica L., MANGO, Asiatic, a tree with simple long lanceolate entire leaves, and yellow edible ovoid somewhat flattened fruit 2′–4′ long with a large fibrous-coated stone, is frequently planted, but no considerable amount of fruit is produced in Bermuda, although a few trees bear abundantly. It is native of the East Indies and widely naturalized in tropical America. The small greenish flowers are borne in large terminal panicles.

Schinus mólle L., PEPPER-TREE, SPANISH PEPPER, South American, a small tree with pinnate leaves of many lanceolate acute entire leaflets 1′–2′ long, small greenish dioecious flowers in terminal panicles, the pistillate trees bearing panicles of smooth shining globular drupes about 4″ in diameter, is occasionally planted; it has become naturalized in California and in Mexico.

Rhus incisa L. f., CUT-LEAVED SUMAC, South African, introduced at Mt. Langton by Lefroy prior to 1874, is a low shrub with pinnatifid leaflets 1′ long or less, the panicles of small flowers densely tomentose.

Rhus juglandifólia H.B.K., WALNUT-LEAVED SUMAC, South American, also brought to Mt. Langton by Lefroy, disappeared prior to 1901.

Spondias purpúrea L., SPANISH PLUM, tropical American, is a tree with alternate pinnate leaves of 7–23 obovate, or oblong, entire or shallowly toothed leaflets about 1′ long, small, greenish flowers in mostly lateral panicles, the purple, obovoid fruits 1′–2′ long. A tree on the Chapman Estate, St. George's, observed in 1913, was about 30′ high, spreading some 50′.

Spondias Mómbin L., HOG PLUM, West Indian, a large or middle-sized tree, rough-barked when old, the alternate pinnate leaves of 7–17 ovate or ovate-lanceolate, acuminate leaflets 2′–4′ long, the small, yellowish-white flowers in large terminal panicles, the fruit a yellow ovoid large-stoned drupe 1′–2′ long, is occasionally planted. [*S. lutea* L.]

Anacardium occidentàle L., CASHEW-NUT, of Tropical America, recorded by Jones in 1873 as grown in Bermuda, is not mentioned by other authors. It is a tree up to 25° high, with spreading branches, obovate or elliptic, simple, entire, petioled leaves 4′–6′ long, panicled small greenish flowers, and leathery fruits, deeply notched, about 1′ long, on greatly enlarged pedicels.

Family 2. **ILICÀCEAE** Lowe.

HOLLY FAMILY.

Shrubs or trees, with watery sap, and alternate petioled simple leaves. Flowers axillary, small, white, mainly polygamo-dioecious, regular. Stipules minute and deciduous, or none. Calyx 3–6-parted, generally persistent. Petals 4–6 (rarely more), separate, or slightly united at the base, hypogynous, deciduous, imbricated. Stamens hypogynous, as many as the petals, or sometimes more; anthers oblong, cordate. Disk none. Ovary 1, superior, 3–several-celled; stigma discoid or capitate; style short or none; ovules 1 or 2 in each cavity. Fruit a small berry-like drupe, enclosing several nutlets. Seed pendulous; endosperm fleshy; embryo straight.

Three genera and about 300 species, of temperate and tropical regions.

1. **ÌLEX** L.

Leaves minutely stipulate. Flowers cymose or solitary, perfect or polygamous. Calyx small, 4–5-cleft or 4–5-toothed. Petals 4–9, somewhat united at the base, oblong, obtuse. Stamens of the same number, adnate to the base of the corolla. Berry-like drupe globose, with 4–8 bony or crustaceous nutlets.



[Ancient name of the Holly Oak.] About 280 species, mostly of America. Type species: *Ilex Aquifolium* L.

1. Ilex vomitòria Ait. CASSENA. YAUPON. HOLLY. BOX. SOUTH SEA TEA. (Fig. 247.) A shrub, or small tree up to 20° high, the bark smooth. Petioles and young twigs puberulent; leaves ovate-oblong or elliptic, evergreen, ½′–1½′ long, 4″–9″ wide, obtuse at both ends, crenate, glabrous, pale beneath, dark green above; petioles 1″–2″ long; staminate cymes several-flowered, short-peduncled; fertile cymes sessile, 1–3-flowered; drupe red, 2″–3″ in diameter. [*Ilex Cassine* of Lefroy, H. B. Small and Verrill.]

Hillsides and borders of marshes, especially in the central parishes. Naturalized. Native of the southeastern United States. Recorded as introduced from Virginia in the 18th century. Used for decorations at holiday time.

Ilex Aquifòlium L., EUROPEAN OR ENGLISH HOLLY, with evergreen ovate spiny-serrate leaves and red fruit, was in a garden at St. George's about 1875.

Family 3. **CELASTRÀCEAE.** Lindl.

STAFF-TREE FAMILY.

Trees or shrubs, often climbing. Leaves simple. Stipules, when present, small and caducous. Flowers regular, generally perfect, small. Pedicels commonly jointed. Calyx 4–5-lobed or -parted, persistent, the lobes imbricated. Petals 4 or 5, spreading. Stamens inserted on or under the disk. Disk flat or lobed. Ovary sessile, mostly 3–5-celled; style short, thick; stigma entire or 3–5-lobed; ovules 2 in each cavity, anatropous. Fruit various. Seeds arilled; embryo large; cotyledons foliaceous. About 45 genera, and 375 species, widely distributed.

Flowers 5-parted; ovary-cells 2-ovuled. 1. *Elaeodendron.*
Flowers mostly 4-parted; ovary-cells 1-ovuled. 2. *Rhacoma.*

1. **ELAEODÉNDRON** Jacq. f.

Trees or shrubs, with opposite or alternate coriaceous leaves, the very small stipules caducous, and small, often dioecious greenish or white flowers in small axillary clusters. Calyx 5-parted. Petals 5, spreading. Stamens 5, inserted under the disk; filaments short; anthers globose. Ovary adnate to the disk, 2–5-celled; style short; stigma 2–5-lobed; ovules 2 in each ovary-cavity. Fruit a rather large drupe. [Greek, Olive-wood, the fruit resembles an olive.] About 35 species, natives of tropical regions. Type species: *Elaeodendron orientale* Jacq.



1. Elaeodendron Laneànum A. H. Moore. BERMUDA OLIVE-WOOD BARK. (Fig. 248.) An evergreen tree up to 45° high, the usually short trunk sometimes 20° high, and up to 20′ in diameter, main branches nearly erect; twigs very densely leafy; outline of the tree ovate when isolated and bearing branches to the ground. Leaves erect-ascending, nearly equally dark green on both sides, somewhat convex, thick and firm, somewhat shining above, dull beneath, oblanceolate, 2½′–4′ long, 1½′ wide or less, acute at apex, cuneate at base, midvein impressed above, prominent beneath; veins diverging at about 45° from the midvein, and 6 to 9 on each side, ultimate venation obscure, delicately reticulated; margin of leaf horny, distantly low-serrate to below the middle, the teeth tipped by black conic prickles about ¼″ long; petioles rather stout, nearly terete, 2½″–4″ long; flowers clustered in the axils, dioecious, about 3″ broad; sepals ovate to oblong or oblong-spatulate, about as long as the elliptic petals; fruits solitary or 2–4 together, stalked, yellowish-white, ovoid to globose, shining, obtuse and rounded, ½′–1′ long, ¾′–¾′ thick, the white flesh 2″–3″ thick, sweet; stone oblong, bluntly angled, pointed at each end, about twice as long as thick, only one cavity seminiferous in specimens examined; seed lenticular, brown, about 1″ thick. [*E. xylocarpum* of Rein. Hemsley, Verrill and Lefroy; *E. xylocarpum bermudense* Urban.]

Rocky hillsides, frequent from Tucker's Town to Joyce's Dock and on Abbot's Cliff. Native. Endemic. Flowers in late winter and spring. The tree is occasionally planted for ornament. Nearest related to *Elaeodendron attenuatum* A. Rich., of the Bahamas and Cuba, which has pale green leaves and yellow-green fruit, and from which the Bermuda plant probably originated through drifted fruits. The wood is very dense and the tree is of slow growth. Very few seedlings exist, for the fruits are eaten, presumably by rats, as fast as they fall. Its bark was used for tanning in the early days of the colony. Seeds taken to New York in 1912 germinated promptly in a greenhouse.

2. RHÁCOMA L.

Shrubs or low trees, with coriaceous small evergreen leaves, and small perfect greenish axillary flowers. Calyx 4–5-lobed. Disk depressed, 4–5-lobed. Petals 4 or 5, inserted under the disk. Stamens 4 or 5. Ovary 4-celled; stigmas 4; ovules 1 in each cavity of the ovary, erect. Drupe with a fleshy thin exocarp and a bony stone. [Name used by Pliny for some Old World plant.] About 12 species of warm and tropical America, the following typical.



1. Rhacoma Crossopétalum L. RHACOMA. (Fig. 249.) A shrub or tree up to 25° high with smooth grey bark and angular twigs. Leaves opposite or whorled, elliptic to oblong or obovate, short-petioled, ½′–1½′ long, somewhat crenate, glabrous, acutish or blunt at the apex, narrowed at the base, paler green beneath than above; flowers clustered in the axils; calyx urceolate, with 4 obtuse lobes; petals 4; disk 4-lobed; stamens 4, inserted between the lobes of the disk; ovary 4-celled; drupe about 3″ long slightly oblique, red. [*Myginda Rhacoma* Sw.]

Found by Lefroy in Southampton Parish about 1875. Not found by subsequent collectors. Native. Florida and the West Indies. Fruit ripe in January. Flowers presumably in spring, that being its flowering time in the Bahamas.

Euonymus japónicus L., JAPANESE SPINDLE-TREE, an evergreen shrub, 4°–8° high, with short-petioled, elliptic to obovate crenate obtuse leaves 1′–2½′ long, the greenish 4-parted small flowers in forked cymes, the subglobose capsules pink, was occasional in gardens.

Family 4. DODONAEÀCEAE H.B.K.

DODONAEA FAMILY.

Shrubs or trees, commonly sticky with a resinous excretion. Leaves alternate, simple, without stipules. Flowers clustered, polygamous or polygamodioecious. Sepals 3–5, nearly equal. Corolla and disk wanting. Androecium of 5–8 regularly inserted stamens; filaments distinct; anthers 4-angled. Gynoecium of 3 or 4 united carpels, wholly superior. Ovary 3–4-celled; styles united. Ovules 2 in each cavity, half-anatropous, often superposed, the upper one ascending and the lower one pendulous. Capsule membranous or leathery, reticulated, 2–6-angled, the angles obtuse, or winged, opening septicidally by 2–6 valves. Seed subglobose or flattened, without an aril; endosperm none; embryo spiral. Only the following genus.

1. **DODONÆA** [L.] Jacq.

Characters of the family, as given above. [In honor of Rembert Dodoens, 1518–1585, Dutch herbalist.] About 50 species, tropical and subtropical. Type species: *Dodonaea viscosa* Jacq.



1. Dodonaea jamaicénsis DC. Broom. Dogwood. (Fig. 250.) A shrub, or sometimes a tree up to 20° high, the slender branches nearly erect, the bark rough in irregular ridges. Leaves linear-oblong to narrowly oblanceolate, chartaceous, shining, pinnately veined, 2′–4′ long, 3″–6″ wide, acute or acuminate at the apex, attenuate at base into short petioles; racemes short, few-flowered, much shorter than the leaves; pedicels slender, 2″–4″ long; sepals broadly ovate, green, about 1½″ long; capsule 6″–8″ broad, its wings membranous; seeds black. [*D. viscosa* of Lefroy, Jones, H. B. Small, Verrill and Moore; *D. Burmanniana* of Reade; *D. viscosa* var. *angustifolia* of Hemsley; *D. angustifolia* of Grisebach.]

Common on hillsides over most of the area. Native. Florida, Cuba, Jamaica. Flowers in spring and summer. The largest trees seen were on the talus of Abbot's Cliff, in 1912, reaching a height of about 20 feet. This species is not at all characteristic of the sea-side; *D. viscosa* L., for which it has been mistaken, is, however, a halophyte, widely distributed in the West Indies.

Family 5. **SAPINDÀCEAE** R. Br.

Soapberry Family.

Trees or shrubs, with watery sap, rarely herbaceous vines. Leaves alternate (opposite in one exotic genus), mostly pinnate or palmate, without stipules. Flowers polygamo-dioecious, regular or slightly irregular. Sepals or calyx-lobes 4 or 5, mostly imbricated. Petals 3–5. Disk fleshy. Stamens 5–10 (rarely fewer or more), generally inserted on the disk. Ovary 1, 2–4-lobed or entire, 2–4-celled; ovules 1 or more in each cavity. Fruit various. Seeds globose or compressed; embryo mainly convolute; endosperm none. About 125 genera, including over 1,000 species, widely distributed in tropical and warm regions.

1. **CARDIOSPÉRMUM** L.

Vines, with alternate bipinnate or decompound leaves and small axillary tendril-bearing corymbs of slightly irregular polygamo-dioecious flowers. Tendrils 2 to each corymb, opposite. Pedicels jointed. Sepals 4, the 2 exterior smaller. Petals 4, 2 larger and 2 smaller. Disk 1-sided, undulate. Stamens 8; filaments unequal. Ovary 3-celled; style short, 3-cleft; ovules 1 in each cavity. Capsule inflated, 3-lobed. Seeds arilled at the base; cotyledons conduplicate. [Greek, heart-seed.] About 15 species, of warm and temperate regions. Type species: *Cardiospermum Halicacabum* L.



1. Cardiospermum microcàrpum H.B.K. SMALL-FRUITED BALLOON VINE. (Fig. 251.) Climbing to a length of 5°–10°, branched finely pubescent, slender, the stem grooved. Leaves thin, biternately compound, slender-petioled, 3′–6′ long and about as broad as long, the ultimate segments ovate to lanceolate in outline, coarsely lobed, cleft or incised; peduncles slender, about as long as the leaves; corymbs several-flowered; flowers white, about 2″ broad, the upper petals 3 times as long as the sepals; capsule subglobose, 3-lobed, pubescent, veiny, depressed at the top, about 5″ thick. [*C. Halicacabum* of Reade, Lefroy and Moore.]

Common in thickets between Castle Harbor and Harrington Sound, occasional elsewhere. Native. Florida and the West Indies, tropical continental America. Flowers nearly throughout the year.

Cardiospermum Halicacabum L., BALLOON VINE, of tropical regions, planted for ornament and interest, has larger flowers and globose capsules 1′ long, rounded at the top.

Cardiospermum grandiflòrum Sw., LARGE-FLOWERED BALLOON-VINE, West Indian, with flowers about 5″ wide, and oblong pointed pods nearly 2′ long, the thin leaflets coarsely toothed, is occasionally grown for ornament and interest.

Melicocca bijùga L., GENIP, Tropical American, a tree with evenly pinnate leaves of two pairs of sessile ovate pointed entire leaflets 2½′–5′ long, terminal panicles of small fragrant whitish flowers, the calyx 4-parted, the petals 4 and stamens 8, the fruits fleshy edible green berries about 1′ in diameter, is occasionally planted. A tree at Dunbarton, about 40 years old, was about 30° high in 1914, with a trunk-circumference of 21′; it had not been known to flower.

Litchi Litchi (Lour.) Britton, LEE CHEE, Asiatic, a large tree with evenly pinnate leaves of 3 or 4 pairs of oblong leaflets, large panicles of small apetalous greenish partly dioecious flowers, the pulpy fruit about 1′ in diameter, with a thin, rough shell, is commonly grown in parks and gardens and bears delicious edible fruit ripe in autumn. [*Nephelium Litchi* Camb.; *Dimocarpus Litchi* Lour.]

Euphoria Longàna Lam., LONGAN, East Indian, similar to *Litchi*, but with petaliferous flowers and smaller fruit, was represented by a young tree at the Agricultural Station in 1913. [*Nephelium Longana* Camb.]

Sapindus Saponària L., SOAPBERRY, West Indian, a fine tree with pinnate leaves, the rachis often wing-margined, the lanceolate, falcate leaflets 2 to 4 pairs, the globose fruit ½′ in diameter, its pulp saponifying, has been grown successfully in gardens, flowering in late autumn or winter. According to J. M. Jones trees formerly grew in Bermuda from drifted fruits. Lefroy records the planting of *Sapindus longifolius* Vahl, at Mt. Langton.

Blighia sàpida Korn., AKEE, West African, a large tree with pinnate leaves of 3 or 4 pairs of oblong short-stalked entire leaflets 2½′–4′ long, the

small white flowers in puberulent axillary panicles, with 5 petals and 8 stamens, the fruit a fleshy capsule 3′–4′ long, bluntly 3-angled, splitting and exposing the black seeds which have a white, edible aril, is occasionally planted. A tree about 30° high was seen at Bellevue in 1913. Reade erroneously classed this tree in the Myrtle Family.

Cupania paniculàta Camb., Panicled Cupania, South American, a tomentose shrub, with evenly pinnate leaves of 3–5 pairs of oval, dentate leaflets, panicled, axillary flowers, the fruit 3-lobed capsules, was represented by a single tree at Spanish Point about 1875, as recorded by Lefroy. [*C. fulva* Mart.]

Koelreuteria paniculàta Laxm., Varnish-tree, Chinese, a tree up to 30° high, with deciduous pinnate leaves of 9–15 ovate, toothed leaflets, panicled yellow flowers, and large bladdery pods, is listed by Lefroy, as observed by him somewhere in Bermuda, but no tree has been seen there by me. It is unlikely that it would thrive, as it grows luxuriantly only in regions subject to frost during the winter. Verrill states that it is not common.

Aesculus Hippocástanum L., Horsechestnut, Asiatic, a large tree with opposite digitately compound leaves, large clusters of white mottled flowers, the spiny fruit enclosing one or two large shining seeds, is mentioned by Reade, but does not appear to be represented now in Bermuda. It belongs to the related family Aesculaceae. The record by Lefroy of a *Pavia* in a Hamilton garden, has not been verified.

Acer palmàtum Thunb., Japanese Maple, Japanese, a small tree of the related family Aceraceae, was represented by a plant at Bellevue in 1914, which was not vigorous. The leaves of this species are very deeply, palmately cleft into 5–9 lanceolate, serrate, acuminate lobes, and its fruit, like that of other maples, is of 2 samaras joined at the base.

Acer Negùndo L., Ash-leaved Maple, North American, a species with pinnate leaves, was observed as a young potted plant with variegated foliage, at Mount Hope, in 1914. This variegated race is widely planted for ornament in Europe.

Family 6. **MELIANTHÀCEAE** Endl.

Honey-flower Family.

Trees or shrubs with alternate, stipulate, unevenly pinnate leaves and irregular flowers in terminal or lateral racemes. Calyx 5-parted or 5-cleft, the segments imbricated. Petals 5, very unequal, or only 4. Disk thickened. Stamens 4. Ovary mostly 4-celled; style slender, curved. Fruit a 4-celled capsule. Two genera, with about 10 species, natives of Africa.

Melianthus màjor L., Honey-flower, South African, occasionally grown for ornament and interest, is a glabrous shrub up to 10° in height, with leaves 8′–15′ long, the connate pointed clasping stipules 1′–2′ long, the 9 or 11 oblong, coarsely serrate, sessile leaflets 2′–4′ long, the reddish-brown flowers about 1′ broad in dense racemes often 1° long, the papery 4-lobed capsules 1′–1½′ long, with 2 shining, black seeds in each cavity. It is sometimes called Sumac, erroneously.

Order 20. RHAMNALES.

Shrubs, vines, or small trees, with nearly always alternate leaves. Flowers small, regular. Sepals mostly more or less united. Petals distinct or wanting. Stamens as many as the sepals or calyx lobes, and alternate with them, opposite the petals when these are present. Ovary compound, superior; ovules erect.

Shrubs, small trees, or vines; petals 4 or 5, or none; fruit a drupe or capsule. Fam. 1. RHAMNACEAE.
Vines, climbing by tendrils, rarely shrubs; petals caducous; fruit a berry. Fam. 2. VITACEAE.

Family 1. **RHAMNÀCEAE** Dumort.

BUCKTHORN FAMILY.

Erect or climbing shrubs, or small trees, often thorny. Leaves simple, stipulate, mainly alternate, often 3–5-nerved. Stipules small, deciduous. Inflorescence commonly of cymes or panicles. Flowers small, regular, perfect or polygamous. Calyx-limb 4–5-toothed. Petals 4–5, inserted on the calyx, or none. Stamens 4–5, inserted with the petals and opposite them; anthers short, versatile. Disk fleshy. Ovary sessile, free from or immersed in the disk, 2–5- (often 3-) celled; ovules 1 in each cavity, anatropous. Fruit often 3-celled. Seeds solitary in the cavities, erect; endosperm fleshy, rarely none; embryo large; cotyledons flat. About 50 genera and 600 species, of temperate and warm regions.

Colubrina asiática Brongn., an Asiatic shrub 6°–10° high, with slender branches, ovate dentate acuminate leaves, and small axillary clusters of greenish flowers followed by globose fruits, was found prior to 1879 on St. David's Island, according to Lefroy; it has not been seen there recently.

Under the name *Phylica odorata* Cass., Lefroy records a plant identified in 1873, without record of locality; this is not a published species, and I am unable to determine what he had in mind.

A species of *Ceanothus*, presumably from California, was growing well at Wood Haven in 1914.

Family 2. **VITÀCEAE** Lindl.

GRAPE FAMILY.

Climbing or erect shrubs, with copious watery sap, nodose joints, alternate petioled leaves, and small regular greenish perfect or polygamo-dioecious flowers, in panicles, racemes or cymes. Calyx entire or 4–5-toothed. Petals 4–5, separate or coherent, valvate, caducous. Filaments subulate, inserted at the base of the disk or between its lobes; disk sometimes obsolete or wanting; anthers 2-celled. Ovary 1, generally immersed in the disk, 2–6-celled; ovules 1–2 in each cavity, ascending, anatropous. Fruit a 1–6-celled berry (commonly 2-celled). Seeds erect; testa bony; raphe generally distinct; endosperm cartilaginous; embryo short. About 10 genera and over 500 species, widely distributed.

Hypogynous disk of the flower cup-shaped; leaves 1–3-foliolate. 1. *Cissus.*
Hypogynous disk none; leaves digitately 5–7-foliolate. 2. *Parthenocissus.*

1. **CÍSSUS** L.

Mostly climbing vines with fleshy foliage. Leaves 1–3-foliolate or simple, when compound the leaflets commonly separating in drying. Flowers mostly perfect. Petals usually 4, spreading. Disk cup-shaped, adnate to the base of the ovary, mostly 4-lobed. [Greek, ivy.] A large genus of over 225 species, mostly tropical. Type species: *Cissus vitaginea* L.

1. Cissus sicyoides L. West Indian Cissus. (Fig. 252.) A pubescent high-climbing vine, with striate branches. Leaves fleshy, simple, ovate or oblong-ovate, 1′–4′ long, acute or acuminate, distantly serrate with bristle-tipped teeth, truncate or cordate at the base; petioles ½′–1½′ long; flower-clusters umbel-like, peduncled; berries subglobose, about 5″ in diameter, black; seeds solitary, 2″–2½″ long, acute at the base.

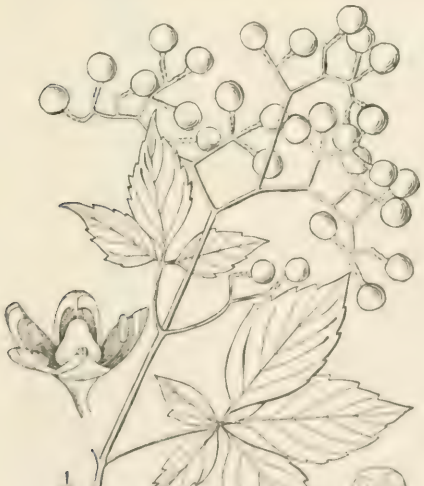
Paget Marsh, 1905; Par-la-Ville, Hamilton, 1912. Native. Florida, West Indies and tropical continental America. Flowers in summer and autumn. Its seeds presumably brought to Bermuda by a bird.

Cissus discolor Bl., Mottled Cissus, Asiatic, an interesting and beautiful climber with ovate mottled leaves, is occasional in gardens.



2. PARTHENOCÍSSUS Planch.

Woody vines, the tendrils often tipped with adhering expansions (disks), or sometimes merely coiling, our species with digitately compound leaves. Flowers perfect, or polygamo-monoecious, in compound cymes or panicles. Petals 5, spreading. Stamens 5. Ovary 2-celled; ovules 2 in each cavity; style short, thick. Berry 1–4-seeded, the flesh thin, not edible. About 10 species, natives of North America and Asia, the following typical.



1. Parthenocissus quinquefòlia (L.) Planch. Virginia Creeper. American Ivy. (Fig. 253.) Tendrils usually numerous, and provided with terminal adhering expansions, the vine sometimes supported also by aerial roots; leaflets oval, elliptic, or oblong-lanceolate, 2′–6′ long, narrowed at the base, coarsely toothed, at least above the middle, glabrous or somewhat pubescent; panicles ample, erect or spreading in fruit; berries blue, about 5″ in diameter; peduncles and pedicels red. [*Hedera quinquefolia* L.; *Ampelopsis quinquefolia* Michx.]

Rocky thickets between Castle Harbor and Harrington Sound, and locally elsewhere on walls and trees. Now nowhere abundant in Bermuda, because much collected under the name Sarsaparilla. Native Eastern North America, Bahamas and Cuba. Jeffrey's record of *Ampelopsis tridentata*, copied by H. B. Shaw, is obscure, as there appears to be no species published under that name

Parthenocissus tricuspidàta (Sieb. & Zucc.) Planch., JAPANESE OR BOSTON IVY, of eastern Asia, climbs high on walls by short disc-bearing tendrils; its shining, cordate, glabrous leaves are 2′–5′ broad, variously 3-lobed and toothed, the lobes acute or acuminate; its small green flowers are in short clusters. [*Ampelopsis tricuspidata* Sieb. & Zucc.; *Ampelopsis Veitchii* MacNab.]

Vitis vinífera L., EUROPEAN GRAPE, European, is commonly planted, and grapes of good quality are produced. Its leaves are nearly or quite glabrous on both sides. The vine was brought to Bermuda as early as 1616.

Vitis Labrùsca L., in the derivative races CONCORD and others, North American, is also commonly planted and fruits abundantly. Its leaves are whitish-wooly beneath.

Order 21. MALVÀLES.

Herbs, shrubs or trees, with simple, mostly alternate leaves. Flowers regular, usually perfect. Sepals separate, or more or less united, valvate. Petals separate, very rarely wanting. Stamens usually numerous. Ovary superior, compound, the placentae united in its axis. Disk inconspicuous or none.

Stamens twice as many as the sepals, or more.
  Stamens in several sets; anthers 2-celled; embryo straight. Fam. 1. TILIACEAE.
  Stamens monadelphous; anthers 1-celled; embryo curved.
    Style branches as many or twice as many as the carpels or ovary-cavities. Fam. 2. MALVACEAE.
    Style entire, or merely lobed. Fam. 3. BOMBACACEAE.
Stamens as many as the sepals. Fam. 4. STERCULIACEAE.

Family 1. **TILIÀCEAE** Juss.

LINDEN FAMILY.

Trees, shrubs or herbs, with alternate (rarely opposite) simple leaves, mostly small and deciduous stipules, and generally cymose or paniculate flowers. Sepals 5, rarely 3 or 4, valvate, deciduous. Petals of the same number, or fewer, or none, mostly imbricated in the bud. Stamens ∞, mostly 5–10-adelphous. Ovary 1, sessile, 2–10-celled; ovules anatropous. Fruit 1–10-celled, drupaceous, dry, or baccate. Cotyledons ovate or orbicular; endosperm fleshy, rarely wanting. About 35 genera and 275 species, widely distributed.

1. **TRIUMFÉTTA** [Plumier] L.

Herbs or shrubs. Leaves alternate, entire, toothed or 3–5-lobed. Flowers perfect, in panicled cymules, axillary or opposite the leaves. Sepals 5, narrow, often mucronate. Petals yellow, 5, convolute, with a pit at the base, or wanting. Stamens numerous or rarely only twice as many as the sepals, inserted on an elongated receptacle above 5 glands; filaments filiform, unequal; anthers introrse. Ovary 2–5-celled, in the cup-shaped top of the receptacle; stigma 2–5-lobed. Ovules 2 in each cavity. Capsule subglobose, echinate, commonly separable into 2–5 carpels. Seeds solitary or 2 in each cavity. Embryo with flat, entire cotyledons. [In honor of G. B. Triumfetti an Italian botanist.] About 70 species, natives of tropical and warm regions. Type species: *Triumfetta Lappula* L.

Petals present, cuneate-spatulate. 1. *T. semitriloba.*
Petals none. 2. *T. Lappula.*

1. Triumfetta semitríloba Jacq. Burr Bush. (Fig. 254.) Annual, stellate-tomentulose. Stems 2½°–4° tall, branched; leaves ovate, rhombic or suborbicular in outline, 1′–4′ long, serrate, angulate or often 3-lobed, rounded or truncate at the base; petioles as long as the blades or shorter; panicles narrow, elongated; sepals lanceolate, about 3″ long, appendaged below the apex; petals cuneate-spatulate, slightly pubescent at the base; stamens often 15; fruit about 2½″ in diameter, 2-celled, copiously prickly, the prickles about as long as the diameter of the body, hooked at the apex. [*T. althaeoides* Lam.]

Hillsides and waste grounds. Native. Florida, West Indies, continental tropical America. Flowers in summer and autumn. Hemsley remarks that it is called "Box Bush."





2. Triumfetta Láppula L. Apetalous Burr Bush. (Fig. 255.) Similar to the preceding species, stellate-tomentulose, 2°–5° high. Leaves broadly ovate to suborbicular, serrate, sometimes lobed; flowers in narrow panicles; petals none; stamens described as 10; fruit subglobose, the prickles about equalling its diameter.

Bermuda is the type locality of this species, cited by Linnaeus from Plukenet's "Almagestum Botanicum" of 1691, and Hemsley states that this specimen is preserved in the Sloane Herbarium. It is listed by Lefroy, and, according to Hemsley, was collected in Bermuda by Moseley and by Lefroy, but it has not been found by subsequent collectors.

Berrya Ammonilla Roxb., Trincomali Wood, East Indian, a large tree, with durable wood, broadly ovate entire cordate long petioled leaves 4′–8′ long, small panicled flowers with 5 spatulate petals, the fruit 3–4 valved, each valve with 2 thin wings nearly 1′ long, is recorded by Jones as grown in Bermuda in 1873.

Family 2. **MALVÀCEAE** Neck.

MALLOW FAMILY.

Herbs or shrubs (sometimes trees in tropical regions), with alternate leaves. Stipules small, deciduous. Flowers regular, usually perfect, often large. Sepals 5 (rarely 3 or 4), more or less united, usually valvate; calyx often bracted at the base. Petals 5, hypogynous, convolute. Stamens ∞, hypogynous, forming a central column around the pistil, united with the bases of the petals; anthers 1-celled. Ovary several-celled; styles united below, distinct above, and generally projecting beyond the stamen-column, mostly as many as the cavities of the ovary. Fruit capsular (rarely a berry), several-celled, or the carpels falling away entire, or loculicidally dehiscent. Seeds reniform, globose or obovoid; embryo curved; cotyledons large, plicate or conduplicate. About 45 genera and 900 species, widely distributed in temperate and tropical regions both of the Old World and the New. Many plants of the family are mucilaginous.

Fruit of several radially arranged carpels, separating from each other when ripe.	
Carpels as many as the stigmas.	
Carpels 2-several-seeded.	
Carpels 1-celled; involucel none.	1. *Abutilon.*
Carpels 2-celled; involucel of 3 bractlets.	2. *Modiola.*
Carpels 1-seeded.	
Stigmas decurrent on the styles.	3. *Malva.*
Stigmas terminal, capitate.	
Involucel of 2 or 3 bractlets.	4. *Malvastrum.*
Involucel none.	5. *Sida.*
Carpels half as many as the stigmas, spiny.	6. *Pavonia.*
Fruit a capsule, or indehiscent.	
Styles distinct; capsules dehiscent.	
Capsule-cavities 1-seeded.	7. *Kosteletzkya.*
Capsule-cavities 2-many-seeded.	
Herbs; or shrubs; involucel-bracts distinct.	8. *Hibiscus.*
Trees; involucel 8-10-toothed.	9. *Pariti.*
Styles united; fruit indehiscent.	10. *Thespesia.*

1. **ABÙTILON** [Tourn.] Mill.

Herbs or shrubs, sometimes trees in tropical countries, mostly soft-pubescent, with cordate angular or lobed leaves and axillary flowers. Involucels none. Calyx 5-cleft. Cavities of the ovary 5–∞, 3–9-ovuled. Style-branches the same number as the ovary-cavities, stigmatic at the apex; carpels 2-valved, often rostrate, falling away from the axis at maturity. Seeds reniform, the upper ascending, the lower pendulous or horizontal. [Name given by the celebrated Arabian physician Avicenna (Ibn Sina), died 1037.] About 100 species, natives of warm and tropical regions, the following typical. The genus contains a number of ornamental species, grown for their flowers. The following naturalized species is a tall coarse weed.

1. Abutilon Abùtilon (L.) Rusby. Velvet Leaf. Indian Mallow. (Fig. 256.) Annual, stout, 3°–7° high, densely velvety-pubescent. Leaves long-petioled, cordate, ovate-orbicular, 4′–12′ wide, dentate, or nearly entire, acuminate, the point blunt; flowers yellow, about 10″ broad; peduncles shorter than the petioles; head of fruit 10″ in diameter or more; carpels 12–15, pubescent, dehiscent at the apex, each valve beaked by a slender awn. [*Sida Abutilon* L.; *Abutilon Avicennae* Gaertn.]

Cultivated ground. Abundant near Spanish Point in 1909 and 1913, occasional elsewhere. Naturalized. Native of southern Asia. Widely naturalized as a weed in the United States. Flowers in summer and autumn.



Abutilon striàtum Dicks., Garden Abutilon, Brazilian, is a tall slender nearly glabrous shrub with slender-petioled, nearly orbicular, sharply 3–5-lobed, dentate, cordate leaves 3′–5′ broad, and drooping long-peduncled red orange red-veined flowers about 1½′ long. Lefroy records it as common in gardens at his time, but it is not much grown now. Several different races and hybrids are in cultivation.

2. MODÌOLA Moench.

Prostrate or ascending herbs, with palmately cleft or divided leaves, and small axillary peduncled red flowers. Bracts of the involucre 3, distinct. Calyx 5-cleft. Cavities of the ovary ∞, 2–3-ovuled. Style-branches stigmatic at the summit; carpels 5–20, septate between the seeds, dehiscent into 2 valves with awn-pointed tips, and aristate on the back. [Latin, from the likeness of the fruit to the small Roman measure, *modiolus*.] A monotypic American genus.



1. Modiola caroliniàna (L.) G. Don. BRISTLY-FRUITED MALLOW. (Fig. 257.) Annual or biennial, more or less pubescent; stems 6′–2° long. Leaves nearly orbicular, ½′–2½′ wide, petioled, 3–5-cleft, the lobes dentate or incised, or sometimes simply dentate; flowers 3″–5″ broad, red; peduncles at length elongated; fruit depressed-orbicular, the carpels bristly. [*Malva caroliniana* L.; *Modiola multifida* Moench.]

Waste and cultivated grounds. Introduced. Native of tropical and warm-temperate America. Flowers nearly throughout the year. It is an occasional weed in Bermuda.

3. MÁLVA [Tourn.] L.

Pubescent or glabrate herbs, with dentate lobed or dissected leaves, and axillary or terminal, solitary or clustered flowers. Calyx 5-cleft. Bractlets of the involucels 3 (rarely none). Petals 5. Cavities of the ovary several or numerous, 1-ovuled; style-branches of the same number, linear, stigmatic along the inner side. Carpels arranged in a circle, beakless, indehiscent. Seed ascending. [Greek, referring to the emollient leaves.] About 30 species, natives of the Old World. Type species: *Malva sylvestris* L.

1. Malva parviflòra L. SMALL-FLOWERED MALLOW. (Fig. 258.) Annual, sparingly pubescent, branched, the branches spreading, ascending or nearly erect, 6′–18′ long. Leaves long-petioled, nearly orbicular in outline or somewhat broader than long, crenate and with about 7 rounded lobes, cordate at the base, 1′–4′ broad; flowers short-pedicelled, clustered in the axils of the leaves; bractlets linear, shorter than the calyx; calyx reticulate-veined, with 5 triangular lobes; petals small, pink; fruit nearly flat, about 4″ broad, its carpels reticulated on the back, pubescent or glabrous. [*M. pusilla* Smith.]

Common in waste and cultivated grounds. Naturalized. Native of the Old World. Naturalized in the United States. Flowers in spring and summer.



Malva rotundifòlia L., the LOW MALLOW, also an Old World species, differs in having larger leaves, and carpels pubescent and not reticulated on the back. It has been recorded as found in Bermuda by Reade, by H. B. Small and by Millspaugh, but the records probably refer to the preceding species.

Malva sylvéstris L., the HIGH MALLOW, European, an erect species with flowers 1′–1½′ broad, the petals much longer than the calyx, is recorded by Reade as escaped from gardens prior to 1883, and mentioned by H. B. Small as escaped and fairly naturalized, has not been seen by us in Bermuda.

4. MALVÁSTRUM A. Gray.

Herbs, with entire, toothed, cordate or divided leaves, and solitary or racemose, short-pedicelled perfect flowers. Calyx 5-cleft. Bractlets of the involucels small, 1–3 or none. Cavities of the ovary 5–∞, 1-ovuled. Style-branches of the same number, stigmatic at the summit only, forming capitate stigmas; carpels indehiscent or imperfectly 2-valved, falling away from the axis at maturity, their apices pointed or beaked. Seed ascending. [Greek, star-mallow.] About 75 species, natives of America and South Africa. Type species: *Malvastrum coccineum* (Pursh) A. Gray.

1. Malvastrum coromandelianum (L.) Garcke. FALSE MALLOW. (Fig. 259.) Perennial, strigose-pubescent, branched, 1°–3° high. Leaves ovate to oblong-ovate, slender-petioled, 1′–3½′ long, acute, sharply serrate; flowers mostly solitary in the axils, on peduncles shorter than the petioles; involucels of 3 small bractlets; calyx-lobes triangular, acute, longer than its tube; petals pale yellow, somewhat longer than the calyx, obliquely truncate; carpels 8–12, hirsute on top, with a beak near the inflexed apex and 2 beaks on the back. [*Malva coromandeliana* L.; *Malvastrum americanum* Torr.; *Malvastrum tricuspidatum* A. Gray; *Sida glomerata* of Hemsley.]

Waste and cultivated grounds. Introduced. Native of the southern United States and tropical America. Flowers from spring to autumn.



5. SIDA L.

Herbs, with serrate crenate or lobed leaves, and perfect flowers. Bractlets of the involucels none. Calyx 5-toothed or 5-cleft. Cavities of the ovary 5–∞, 1-ovuled; style-branches of the same number, stigmatic at the summit. Carpels indehiscent, or at length 2-valved at the apex. Seed pendulous. [Greek, used by Theophrastus.] About 100 species, natives of the warmer parts of America, Asia, Africa and Australasia. Type species: *Sida alnifolia* L.

Leaves rhomble to oblanceolate; peduncles elongated. 1. *S. rhombifolia.*
Leaves ovate to lanceolate; peduncles short. 2. *S. carpinifolia.*



1. **Sida rhombifòlia** L. RHOMBIC-LEAVED SIDA. (Fig. 260.) Annual, puberulent to glabrate. Stems erect, 1½°–2½° tall, branching; leaves rhombic, elliptic-obovate or oblanceolate, ½′–3½′ long, acute or obtuse, serrate except near the base, pubescent with pale hairs beneath; petioles 1½″–4″ long; peduncles, at least those arising from the stem, much longer than the petioles, mostly ½′–1½′ long; calyx puberulent, its tube finally 5–10-ribbed, its lobes triangular, acuminate, about as long as the tube; petals pale yellow, 3″–4″ long, sometimes blotched with red at the base; carpels 10 or 12, subulate-beaked.

Cultivated land between Harrington Sound and Castle Harbor. Introduced. Native of the southern United States and tropical America. Flowers from spring to autumn.



2. **Sida carpinifòlia** L. f. HORNBEAM-LEAVED SIDA. WIRE-WEED. (Fig. 261.) Puberulent or glabrous. Stems erect, 1°–3° tall, branching; leaves lanceolate, oblong-ovate or ovate, 1′–4′ long, acute or acuminate, irregularly serrate, obtuse or subcordate at the base, the petioles 1½″–4″ long; stipules conspicuous, narrowly linear to lanceolate, surpassing the petioles; peduncles mostly shorter than the pedicels, ½′–3½′ long; calyx 5–10-ribbed, its lobes triangular, slightly acuminate, about as long as the tube; petals yellow to white, 3″–6″ long; carpels reticulate-wrinkled, 2-beaked. [*Sida spinosa* of Millspaugh; *S. antillensis* Urban.]

Common in waste and cultivated ground. Introduced. Native of the southern United States and tropical America. Flowers from spring to autumn. Lefroy remarks that this weed is mentioned in Bermuda laws as early as 1669. Both broad-leaved and narrow-leaved races are found.

6. PAVONIA Cav.

Shrubs or shrubby herbs. Leaves alternate, stipulate, angled or lobed. Flowers perfect, commonly solitary on axillary peduncles. Involucel of 5–15 bractlets. Sepals 5, partially united. Petals 5. Carpels 5, 1-celled. Styles 10. Stigmas 10, capitate. Ovules solitary. Mature carpels separating from the axis, 1–3-beaked on the back or beakless, more or less deeply 2-valved. Seeds solitary, ascending. [In honor of Joseph Pavon, Spanish botanist and explorer.] Sixty species or more, mostly of tropical distribution, the following typical.

1. Pavonia spinifex (L.) Cav. PAVONIA. (Fig. 262.) A branching shrub, 2°–9° tall, hirsute and strigillose. Leaves ovate or oblong-ovate, 2′–4′ long, acute or somewhat acuminate, doubly crenate-dentate, truncate or subcordate at the base; the petioles densely pubescent; peduncles axillary, much longer than the petioles; bractlets of the involucel 5, linear to lanceolate, acute, nearly 5″ long; calyx about as long as the bractlets, its lobes lanceolate to ovate-lanceolate; petals yellow, 1′ long, cuneate; carpels 2½″–3″ high, with 1 medial and 2 lateral retrorsely barbed awns. [*Hibiscus spinifex* L.]



Collected by Lefroy in Southampton Parish, prior to 1879; his specimen is preserved in the herbarium of the Royal Gardens at Kew. Reade records that it grew near the lighthouse. Introduced. Native of Florida and tropical America. Not found in Bermuda by recent collectors.

7. KOSTELETZKYA Presl.

Perennial, scabrous or pubescent herbs or shrubs, with hastate or angular leaves, and showy, axillary or paniculate flowers. Bractlets several, linear. Calyx 5-toothed or 5-cleft. Stamen-column anther-bearing below for nearly its entire length. Ovary 5-celled, the cavities 1-ovuled; style-branches of the same number, stigmatic at the capitate summits. Capsule depressed, 5-angled. Seeds reniform, ascending. [Named in honor of V. F. Kosteletzky, a botanist of Bohemia.] About 8 species, natives of warm and temperate America. Type species: *Kosteletzkya hastata* Presl.



1. Kosteletzkya virginica (L.) A. Gray. VIRGINIA KOSTELETZKYA. (Fig. 263.) Erect, 2°–4° high, somewhat stellate-pubescent and scabrous. Leaves ovate, or hastate, truncate or cordate at the base, 2′–4½′ long, unequally dentate and often 3-lobed below, acute; flowers pink, 1½′–2½′ broad, in loose terminal leafy panicles; bractlets 8 or 9, linear, shorter than the lanceolate acute calyx segments; carpels 5, hispid-pubescent. [*Hibiscus virginicus* L.; *Althaea officinalis* of Reade, of H. B. Small and of Jones.]

Pembroke, Devonshire and Warwick marshes. Native Southeastern United States. Flowers in late summer and autumn.

8. HIBÍSCUS L.

Herbs, shrubs, or in tropical regions even small trees, with dentate or lobed leaves, and showy, mostly campanulate flowers. Bractlets numerous, narrow. Calyx 5-cleft or 5-toothed. Column of stamens anther-bearing below along much of its length. Ovary 5-celled, the cavities 3–several-ovuled; style branches 5, stigmatic at the capitate summit. Capsule 5-valved. Seeds reniform. [An ancient name, used by Dioscorides for the Marsh Mallow.] About 180 species, widely distributed. Type species: *Hibiscus Trionum* L.



1. Hibiscus Rosa-sinènsis L. CHINESE ROSE. SHOEBLACK PLANT. (Fig. 264.) A shrub, rarely forming a small tree, up to 12° or 15° high, the young parts sparingly pubescent or glabrate. Leaves ovate or ovate-lanceolate, acute at the apex, rounded or abruptly narrowed at the base, 3′–8′ long, coarsely unequally dentate; bractlets narrowly linear, about half as long as the calyx; calyx-lobes lanceolate, pubescent, especially within; petals rose-red, purple or white, 4′–6′ long; capsule about 1′ long. [*H. Cooperi* of gardeners.]

Extensively planted for ornament in a variety of races, and occasional in waste places. Introduced. Native of China. Widely naturalized in Florida and the West Indies. Flowers in summer and autumn.

Hibiscus Arnottiànus A. Gray, HAWAIAN HIBISCUS, a beautiful species endemic in the Sandwich Islands, grown in 1913 in gardens at St. Georges', has broadly ovate leaves 4′–5′ long, their margins crenulate, and pure white flowers about 4′ long, the bractlets only about one-fourth as long as the narrow calyx.

Hibiscus mutábilis L., CHANGEABLE ROSE, East Indian, a tall shrub with large, broad, angulately-lobed, cordate, stellate-pubescent leaves, the large red flowers changing to white, is considerably planted in gardens and hedges. It blooms in summer and late autumn.

Hibiscus syriàcus L., SHRUBBY ALTHAEA, ROSE-OF-SHARON, of western Asia, a shrub with ovate, coarsely toothed or lobed leaves and axillary, short-stalked, purple or white flowers 2′–3′ wide, is occasionally grown for ornament. The flowers are often double.

Hibiscus spiràlis Cav., BANCROFT'S HIBISCUS, of tropical America and Florida, recorded by Lefroy as grown at the public buildings and elsewhere prior to 1877 and also mentioned by Verrill, is a low shrub, 3° high or less, with ovate to triangular, serrate leaves 1′–3′ long, and slender-peduncled, red flowers about 1′ long. [*H. Bancroftianus* Macf.]

Hibiscus grandiflòrus Michx., LARGE-FLOWERED HIBISCUS, North American, recorded by Jones, by Lefroy and by Verrill as formerly grown in Ber-

muda, is a velvety perennial up to 6° high, with ovate to lanceolate, serrate leaves 4′–8′ long, its pink petals crimson-blotched at the base, 4′–5′ long.

Hibiscus diversifòlius Jacq., PRICKLY HIBISCUS, African, seen in the garden at Dunbarton in 1914, is a prickly shrub about 5° high, with variously lobed, long-petioled leaves 3′–6′ broad, and short-pedicelled, large, yellowish or purplish flowers.

9. **PARÍTI** Adans.

Trees, with broad cordate petioled leaves, large deciduous stipules, and large, terminal or axillary flowers, solitary or few together, the petals yellow or changing to red. Involucre 8–10-toothed. Calyx 5-toothed. Style pubescent above, 5-cleft, the stigmas broad. Capsule loculicidally 5-celled, many-seeded, the cells vertically partitioned by a dissepiment, which splits at dehiscence into two membranes. [Name said to be Malabaric.] A few species of tropical regions, the following typical.

1. Pariti tiliàceum (L.) Juss. MAHOE. (Fig. 265.) A tree, sometimes 50° high, the young foliage velvety-tomentose. Leaves long-petioled, the blades 3′–8′ broad, nearly orbicular, cordate at base, abruptly acuminate at apex, shallowly dentate or subentire, the venation prominent beneath; involucre 10-cleft, about ½′ long; petals yellow, obovate, 2′–2½′ long; calyx about 10″ long; capsule ovoid, tomentose, 7″–9″ long; seeds glabrous or minutely downy. [*Hibiscus tiliaceus* L.]



Border of a mangrove swamp near the west end of the causeway a large tree observed in 1913; apparently not planted. Lefroy records that a tree was grown from seed washed ashore about 1825, and that prior to 1879 there was a large tree at Somerville, Smith's Parish. Occasionally planted for shade. Flowers in summer and autumn. Naturalized. Erroneously called Tulip-tree in Bermuda.

10. **THESPÈSIA** Soland.

Shrubs or trees. Leaves alternate, entire or merely angulately lobed, commonly large, usually cordate, petioled. Flowers perfect, showy. Involucel of 3–5 narrow deciduous bractlets. Calyx truncate or nearly so. Petals 5. Ovary sessile, 5-celled; styles 5, united or rarely distinct; stigmas decurrent on the styles. Ovules few in each cavity. Capsule firm, woody-leathery, 5-celled, indehiscent. Seeds several in each cavity, glabrous or pubescent. [Greek, marvellous.] About 8 tropical species, the following typical.



1. Thespesia popùlnea (L.) Soland. SEASIDE MAHOE. (Fig. 266.) An evergreen shrub or a low tree. Leaves leathery, ovate, 2′–6′ long, acute or acuminate, undulate, cordate; petioles shorter than the blades; peduncles stout, shorter than the subtending petioles; bractlets of the involucels linear, early deciduous; calyx cup-shaped, entire; petals 2′–3′ long, yellow with a purple base; capsule about 1½′ wide; seeds veiny, appressed-pubescent. [*Hibiscus populneus* L.]

Recorded by Lefroy as growing prior to 1879 in the cove at Clarence Hill and elsewhere and by Hemsley as found at St. George's. A tree 20° high was observed in 1913 at Holly Lodge. Introduced. Native of tropical America, where it is a common seashore tree; no evidence is at hand to show that it exists in Bermuda now except as planted trees.

Abelmoschus esculéntus (L.) Moench, OKRA, GUMBO, African, commonly cultivated for its pods, is a somewhat hairy annual, 4°–9° high, with petioled, lobed and serrate leaves 4′–8′ broad, solitary peduncled axillary yellow flowers with a red center, the petals about 2′ long, and ribbed, pointed pods 5′–10′ long, mucilaginous when cooked. [*Hibiscus esculentus* L.]

Althaea ròsea (L.) Cav., HOLLYHOCK, Chinese, is grown to some extent as a garden flower, principally in double-flowered kinds, its petals of nearly all colors. It has wandlike stems 4°–8° high, rough cordate suborbicular angular-lobed, long-petioled leaves often 6′ broad, the upper smaller, and sessile axillary flowers 3′–5′ broad. [*Alcea rosea* L.]

Gossypium herbàceum L., COTTON, unknown in a truly wild condition, but regarded by Sir George Watt as probably indigenous originally in Arabia and Asia Minor, was cultivated and spun in Bermuda early in the history of the colony. Cotton plants may still occasionally be seen in gardens, but no cultivation is attempted.

Malvaviscus móllis DC., VELVETY MALVAVISCUS, Mexican, a stellate-velvety shrub about 3° high, with long-petioled, broadly ovate, crenate and often 3-lobed leaves 3′–5′ long, axillary peduncled flowers about 1½′ long, the narrow sepals 4″–6″ long, the corolla red, is often grown in gardens, and is sometimes seen about old houses.

Lavatera triméstris L., HERBACEOUS LAVATERA, of the Mediterranean region, a branching, hairy-stemmed annual 2°–5° high, with somewhat pubescent, slender-petioled, broadly ovate, angular-lobed and serrate, acute leaves 2′–3′ long, and axillary peduncled rose-colored flowers 2½′–4′ broad, the receptacle of the fruit expanded into a disk above the row of finely ridged carpels, was grown in gardens at St. George's and on St. David's Island in 1914.

Plagianthus pulchéllus (Willd.) A. Gray, PRETTY PLAGIANTHUS, Australian, a large shrub, with lanceolate, crenate leaves about 3′ long, acuminate

at the apex, cordate at the base, the small flowers in axillary dense racemes, the white petals only 2″–3″ long, the carpels in a single row, is recorded by Lefroy as uncommon in gardens, called SWEET, or WHITE ABUTILON. [*Abutilon pulchellum* Sweet; *Sida pulchella* Willd.]

Family 3. **BOMBACÀCEAE** Schumann.

BOMBAX FAMILY.

Trees, mostly with palmately compound leaves and large and showy perfect flowers. Calyx inferior, mostly 5-toothed. Petals 5. Stamens commonly very numerous, with long filaments and short anthers. Ovary 2–5-celled; style simple; stigmas as many as the ovary-cavities. Fruit various, dry or fleshy. Seeds usually woolly. About 20 genera and over 100 species, natives of tropical regions.

Ceiba pentándra (L.) Gaertn., SILK-COTTON TREE, a very large tree with spreading branches, native of tropical America and tropical Asia, has a trunk armed with spines, its base with large buttresses. The long-petioled palmately compound leaves have 5 or 7 lanceolate leaflets 4′–6′ long; the large flowers are in stalked lateral or axillary clusters, and the 5-celled capsules enclose many seeds enveloped in wool. [*Eriodendron aufractuosum* DC.; *Bombax pentandrum* L.; *Bombax Ceiba* of Lefroy and of H. B. Small.]

Two of the trees mentioned by Lefroy as planted at Mount Langton by Governor Reid in 1845 existed there in 1914, having attained great size at the base of the hill; the straight columnar trunks were then over five feet in diameter and at least sixty feet in height. A few smaller trees may be seen in other places; one at Orange Valley, seen in 1914, was then about 2½° in trunk diameter.

Ochroma Lágopus Sw., CORKWOOD, of tropical America, represented in 1913 by a young plant at the Agricultural Station, is a large tree with orbicular cordate long-petioled, entire or lobed leaves often 1° broad, more or less stellate-pubescent, large terminal flowers, and large 5-celled capsules containing many seeds covered with brown wool. Its wood is very light in weight.

Bombax aquáticum (Aubl.) Schum., BOMBAX, planted experimentally at the Public Garden, St. George's, in 1914, is a South American tree with petioled, palmately compound leaves of 5–9 ovate-lanceolate leaflets, the large and showy flowers with 5 oblong, yellowish petals and very numerous red stamens. [*Pachira aquatica* Aubl.; *Carolinea princeps* L. f.]

Family 4. **STERCULIÀCEAE** H.B.K.

CHOCOLATE FAMILY.

Shrubs, trees or herbs. Leaves alternate, simple, entire or toothed. Flowers mostly perfect, regular, in spikes, racemes or panicles. Calyx of 5 distinct or nearly distinct sepals. Corolla of 5 distinct petals, or wanting. Androecium of as many fertile stamens as there are sepals and alternate with them, or numerous; filaments sometimes in groups, the anthers with parallel sacs, opening extrorsely. Gynoecium of 5 united carpels or rarely of 1 carpel; ovary 5-celled or 1-celled; styles distinct or united. Ovules few or several, ascending or horizontal. Fruit a capsule or follicle. About

50 genera and over 700 species, of wide distribution in tropical and warm temperate regions.

1. WALTHÈRIA L.

Herbs, shrubs or trees, with stellate and simple pubescence. Leaves toothed; stipules narrow. Flowers small, perfect, usually in axillary clusters or small cymes. Involucel of 3 deciduous bractlets. Sepals 5, united at the base into a turbinate 10-nerved tube. Petals 5, spatulate, convolute, withering-persistent. Stamens 5; filaments united below, not accompanied by staminodia; anthers with parallel sacs. Ovary 1-celled, sessile; style simple, not central; stigma club-shaped or brush-like. Ovules 2 in a cavity. Follicles 1-celled, 2-valved lengthwise. Seed solitary, ascending. Endosperm fleshy. Embryo straight, axile. [In honor of A. F. Walther, professor in Leipzig.] About 35 American species, mostly tropical, the following typical.



1. Waltheria americàna L. WALTHERIA. (Fig. 267.) Foliage tomentose. Stems 2°–4° tall, stiff; leaves ovate to oblong, 1′–3′ long, serrate, rounded or cordate at the base, stout-petioled; flowers in dense sessile or peduncled axillary clusters; sepals subulate, about 2½″ long, villous-hirsute, similar to the bractlets; petals yellow, slightly longer than the sepals; follicles about 1½″ long, pubescent at the top.

Abundant on a hillside near Port Royal, 1905. Recorded by Lefroy as growing in Pembroke Marsh and on the hillside prior to 1879. Native. Florida and tropical America. Flowers in summer and autumn. Its seed presumably brought to Bermuda by a bird.

Sterculia apétala (Jacq.) Karst., STERCULIA, a large widely spreading tree up to 50° high, with nearly orbicular, 5-lobed, peltate, stout-petioled leaves often 1° broad, the apetalous unisexual flowers in large terminal panicles, with a yellowish, purple-flecked, stellate-pubescent, campanulate, 5-cleft calyx ¾′ broad, the stamens in a column tipped by 10–20 anthers, the fruit 5 large leathery follicles, has been planted for shade and ornament. A fine specimen on the Wood Estate, Spanish Point, was studied in 1913. [*Helicteres apetala* Jacq.; *Sterculia carthaginensis* Cav.]

Guazuma Guazùma (L.) Cockerell, BASTARD CEDAR, West Indian, was represented by a healthy tree in the officer's garden, St. George's, about 1874, recorded by Lefroy, and a large tree, said to flower but not to bear fruit, was seen at The Stocks, St. David's Island, in 1914, when it had a trunk circumference of five feet and one inch. In the West Indies it becomes 50° high; its oblong to ovate, oblique, serrate leaves are about 3′ long, its axillary flowers in

corymbs, its subglobose to oblong, tubercled, woody fruit about 1′ long. [*Theobroma Guazuma* L.]

Melochia odoràta L. f., Fragrant Melochia, of Tanna Island, recorded by Hemsley as found by Lefroy in Pembroke Marsh, is a tree with thin broadly ovate, petioled serrate subcordate leaves 3′–4′ long, its small flowers in axillary pedunceled corymbs.

Firmiana platanifolia (L.) Schott & Endl., Chinese Parasol Tree, of eastern Asia, occasionally planted, is a tree becoming 40° high, with suborbicular cordate 5-lobed leaves often 1° broad or more, loosely pubescent beneath, the lobes acute or acuminate, the sinuses rounded or obtuse, the rather small greenish apetalous flowers in large terminal panicles, the calyx-lobes narrow. [*Sterculia platanifolia* L.]

Order 22. HYPERICÀLES.

Herbs, shrubs, or trees, the flowers mostly complete, perfect and regular (irregular in Violaceae). Sepals distinct, or more or less united, imbricated or convolute. Petals almost always present and distinct. Stamens usually numerous. Ovary compound, superior; placentae mostly parietal.

Styles none; trees or shrubs with small imbricated leaves. Fam. 1. Tamaricaceae.
Styles present, separate or united.
  Styles separate or partly united.
    Stigmas not brush-like; endosperm little or none.
      Trees or shrubs with alternate leaves. Fam. 2. Theaceae.
      Leaves opposite or verticillate.
        Herbs or low shrubs, rarely trees; flowers perfect. Fam. 3. Hypericaceae.
        Trees or shrubs with dioecious or polygamous flowers. Fam. 4. Clusiaceae.
    Stigmas brush-like; endosperm copious. Fam. 5. Turneraceae.
  Styles completely united; endosperm fleshy.
    Corolla regular.
      Petals mostly 4 or 5; anthers opening by pores or valves. Fam. 6. Bixaceae.
      Petals mostly wanting; anthers longitudinally dehiscent. Fam. 7. Flacourtiaceae.
    Corolla irregular. Fam. 8. Violaceae.

Family 1. TAMARICÀCEAE Lindl.

Tamarix Family.

Shrubs or trees. Leaves alternate, without stipules, relatively small or scale-like, entire, often imbricated. Flowers mainly perfect, regular, usually in spikes or racemes. Calyx of 5, or rarely 4 or 6, imbricated sepals. Corolla of 5, or rarely 4 or 6, distinct imbricated petals. Disk 10-lobed or obsolete. Stamens 5 to many; filaments distinct, free; anthers opening lengthwise. Ovary 1-celled, superior, with 3–5 basal placentae. Stigmas 3–5, distinct. Ovules 2–many on each placenta. Fruit a capsule. Seeds erect, each terminating in a coma. Four genera and about 100 species, natives of the Old World.

1. TÁMARIX L.

Shrubs or trees, with irregularly and widely branching stems, the wood firm. Leaves small, scale-like, clasping or sheathing. Flowers in dense spikes, racemes or panicles. Sepals 4–5, or rarely 6, distinct. Petals small, white or pink, inserted under the lobed disk, distinct. Stamens 5–10; filaments not adnate to the corolla. Ovary with basal placentae. Stigmas 2–5, short. Fruit

capsular. Seeds numerous; endosperm wanting. [Latin name.] About 60 species, of the Old World, the following typical.



1. Tamarix gállica L. TAMARISK. (Fig. 268.) A shrub or a small tree, with slender spreading branches, the branchlets very numerous, approximate or clustered, completely clothed with the imbricated scale-like acute leaves which are 1″ long or less; spikes numerous, in conspicuous panicles; sepals triangular, about ½″ long; petals white or pinkish; capsule pyramidal, about 1″ long.

Commonly planted as a screen along coastal roads and elsewhere and completely naturalized. Known locally as Spruce.

The related family **Cistaceae** (ROCK-ROSE FAMILY), was represented in Bermuda by three species of *Cistus* (*C. laurifolius* L., *C. salvifolius* L. and *C. monspeliensis* L.), recorded by Lefroy as introduced, presumably at Mt. Langton, in 1874, and remaining alive until 1877, but not appearing to flourish, and not to be seen there now.

Family 2. **THEÀCEAE** DC.

TEA FAMILY.

Trees or shrubs with alternate or rarely opposite mainly estipulate leaves, and large regular mostly perfect flowers. Sepals 5 (rarely 4–7), imbricated. Calyx often 2-bracted at the base. Petals 5 (rarely 4–9), hypogynous, imbricated, crenulate. Stamens ∞, numerous, hypogynous, more or less united at their bases. Ovary sessile, 2–several-celled; ovules 2 or more in each cavity. Fruit a 3–5-celled generally woody capsule. Endosperm little or none; embryo large, with conduplicate cotyledons. About 16 genera and 160 species, natives of tropical and warm regions.

Camellia japónica L., CAMELLIA, of Japan and China, is occasionally planted for ornament, but does not succeed very well. Usually a shrub, it may, under favorable conditions, develop into a tree up to 40° high; the evergreen thick ovate-elliptic, serrate leaves are 2′–4′ long, shining dark green on the upper side, and the white or red flowers, often double, are mostly solitary at the ends of twigs or in the axils, sometimes up to 5′ broad, the petals rounded.

Family 3. **HYPERICÀCEAE** Lindl.

ST. JOHN'S-WORT FAMILY.

Herbs or shrubby plants. Leaves opposite or rarely whorled, without stipules, pellucid-punctate, entire or nearly so. Flowers perfect, regular or nearly so, in cymes. Calyx of 4 or 5 herbaceous sepals. Corolla of 4 or 5 yellow or flesh-colored petals. Stamens few or many, commonly collected in 3 or 5 groups, sometimes accompanied by interposed glands. Fila-

ments slender. Anthers 2-celled, versatile. Ovary sessile, 1-celled, with parietal placentae, or 3–7-celled, with axile placentae. Stigmas often capitate. Fruit a septicidally dehiscent capsule seated in the persistent calyx. Seeds small, without endosperm. About 10 genera and 300 species, widely distributed.

1. ÁSCYRUM L.

Leafy glabrous low shrubs, with narrow leaves and yellow flowers. Sepals 4, in 2 pairs, the exterior ones broad and round, the interior smaller and narrower. Petals 4, oblique or slightly contorted, deciduous. Stamens ∞, distinct, or united in clusters. Ovary 1-celled, with 2–4 parietal placentae; styles 2–4. Capsule 1-celled, 2–4-valved, dehiscent at the placentae. [Greek, not rough.] About 6 species, of North and Central America and the West Indies. Type species: *Ascyrum hypericoides* L.

1. Ascyrum macrosépalum S. Brown. BERMUDA ST. ANDREW'S CROSS. (Fig. 269.) An erect shrub, 1°–2½° high, with slender leafy branches. Leaves linear-oblong, sessile, 5″–7″ long, 1″–1½″ wide, dull green, obtusish, but minutely apiculate at the apex, narrowed to the base, copiously punctate, the midvein prominent beneath; cymes terminal, 1–few-flowered; outer sepals broadly ovate, obtuse, 5″–6″ long, 3½″–4½″ wide, subcordate; petals oblique, spreading in 2 nearly parallel pairs, linear-oblong, acute, 5″–6″ long, 1½″–2″ wide, fugacious, bright yellow; capsule oblong, narrowed at both ends, apiculate, about as long as the outer sepals, twice as long as the narrow, inner ones; seeds greenish-brown, oblong, obtuse at each end, about ½″ long and ¼″ thick. [*Ascyrum Crux-andreae* of Lefroy; *A. hypericoides* of Reade, H. B. Small, Hemsley, Moore and Verrill; *Hypericum?* of Jones.]



Frequent in marshes and on hillsides. Endemic. Its nearest relative is *A. linifolium* Spach, of the southeastern United States and the Bahamas, from which it differs by larger leaves; larger, broadly ovate cordate sepals; and in its seeds. These features were first recorded in *Journal of the New York Botanical Garden* **13**: 192, 1912. The species presumably originated in Bermuda from seeds of *A. linifolium* transported by the wind.

Hypericum perforàtum L., SHRUBBY ST. JOHN'S-WORT, European, is mentioned by Reade as rare in waste grounds prior to 1883. It has not been seen by any of the recent collectors, and, being of northern distribution in Europe and naturalized in North America, would not be likely to become naturalized in these islands. The plant is an erect perennial herb with blunt narrow leaves and cymose yellow flowers, the 5 petals black-dotted. Reade's statement of its occurrence is copied by H. B. Small.

Vismia guianénsis (Aubl.) Pers., GUIANA VISMIA, South American, recorded by Jones in 1873, is a shrub with quadrangular twigs, opposite,

petioled, ovate-elliptic, acuminate leaves 4′–6′ long, and numerous small flowers in terminal panicles, the five petals hairy, the fruit berry-like. H. B. Small regarded the determination of this plant as doubtful.

Family 4. **CLUSIÀCEAE** Lindl.

CLUSIA FAMILY.

Trees, with resinous sap, opposite, entire, leathery leaves, the mostly dioecious or polygamous flowers in cymes or solitary. Sepals 2–6, imbricated. Corolla of 1–9 hypogynous petals. Stamens numerous in the staminate flowers, in the pistillate flowers usually represented by staminodes; filaments usually more or less united into a tube. Ovary 1–several-celled; styles stout, or wanting in some genera; ovules one, several or many, borne on axile placentae. Fruit baccate, drupaceous or capsular. Endosperm none. About 40 genera and some 500 species, natives of tropical regions.

1. **CALOPHÝLLUM** L.

Trees with short-petioled, coriaceous, pinnately striate-veined leaves, and lateral, axillary or terminal, polygamous flowers in racemes or panicles. Sepals 2–4; petals 1–4, or wanting. Stamens many, distinct, or their bases united; filaments short; anthers ovate or oblong. Ovary 1-celled; style long or short, the stigma peltate; ovule 1, erect. Fruit a drupe. [Greek, beautiful-leaved.] About 25 species, mostly of tropical Asia, a few in tropical America, the following typical:

1. Calophyllum Calàba Jacq. GALBA. SANTA MARIA. (Fig. 270.) A tree, becoming at least 60° high, often branched nearly to the base. Leaves elliptic or oblong-elliptic, 3′–6′ long, glabrous, dark green, rounded or slightly emarginate at the apex, narrowed or obtuse at the base, shining, the midvein rather prominent, the lateral veins very numerous and close together; racemes lateral or axillary, few-flowered, much shorter than the leaves; pedicels rather stout, 2″–5″ long; flowers white, fragrant, the few petals about twice as long as the orbicular sepals, or petals wanting; staminate flowers with about 50 stamens; pistillate flower with a short style, a globose ovary and many staminodes; drupe nearly 1′ in diameter, the endocarp crustaceous.



Hillsides, hedges, and planted along roads. Introduced from the West Indies and naturalized. Flowers in late summer and autumn.

Mammea americàna L., MAMMEE APPLE, West Indian, is represented by a few trees in gardens; a fine tree may be seen at Par-la-Ville. It has thick, leathery, oblong-obovate leaves 4′–8′ long, few or solitary, large white axillary flowers, and large, russet-colored drupes 3′–6′ in diameter.

Garcinia Xanthochymus Hook. f., East Indian, is a small tree, related to the Mangosteen. A tree 12° high, called "Lemon Squash," was observed at Bellevue in 1913; it has leathery oblong pointed entire leaves about 10′ long

and 4′ wide, shining above, dull beneath, and ovoid pointed fleshy fruits about 2′ long.

Garcinia Livingstònei T. Anders., Livingstone's Garcinia, of tropical Africa, an old plant of which was seen at Montrose in 1914, is another relative of the Mangosteen, with elliptic, very obtuse, crenulate veiny short-petioled leaves 3′–6′ long, 1½–4′ wide, and edible fruit about 1′ in diameter.

Family 5. **TURNERÀCEAE** H.B.K.

Turnera Family.

Perennial herbs or shrubby plants. Leaves alternate, simple, sometimes with 2 glands at the base. Flowers mostly perfect, regular, axillary. Calyx of 5 imbricated sepals. Corolla of 5 convolute deciduous petals. Stamens 5, inserted with or near the petals; filaments distinct; anther-sacs opening lengthwise. Gynoecium compound, of 3 united carpels. Ovary free, 1-celled. Styles 3. Stigmas dilated or usually many-cleft. Ovules numerous in 2 rows on the 3 parietal placentae, these opposite the three styles. Capsule 1-celled, 3-valved. Seeds slightly curved. Embryo straight in the copious fleshy endosperm. Six genera and about 90 species, mostly of tropical distribution.

1. **TÚRNERA** L.

Shrubs or shrubby plants, with glabrous or pubescent foliage. Leaves few, alternate, entire, toothed or pinnatifid. Flowers solitary in the upper axils, or sometimes in clusters. Sepals 5, more or less united, imbricated. Petals 5, usually yellow, convolute, inserted at the throat of the calyx-tube. Stamens 5, inserted near the petals; filaments somewhat flattened, distinct; anthers 2-celled. Stigmas 3, brush-like. Capsule 3-valved. Seeds curved, with a pitted or rough testa. [In honor of William Turner, English botanist.] About 60 species, all but one of them native of tropical and subtropical America, the following typical.

1. Turnera ulmifòlia L. Turnera. (Fig. 271.) A shrub, 1°–3° high, the slender branches ascending, pubescent. Leaves lanceolate to ovate, rather thin in texture, pubescent beneath, 1½′–4′ long, acute or acuminate at the apex, narrowed at the gland-bearing base of the blade, sharply serrate, the pubescent petioles ½′ long or less; peduncles adnate to the petioles; bracts lanceolate, acuminate; petals obovate, bright yellow, much longer than the sepals; capsule subglobose to ovoid, pubescent, about 3″ long, many-seeded, the seeds cylindric.



In thickets between Castle Harbor and Harrington Sound, Abbot's Cliff and Knapton Hill. Native, Florida; West Indies. Its seeds brought to Bermuda, presumably, by a bird or by winds. Occasionally grown in gardens. Flowers in summer and autumn.

Family 6. **BIXÀCEAE** Reichenb.

ANNATTO FAMILY.

Shrubs or small trees. Leaves alternate, simple, toothed, lobed or entire. Flowers perfect. Calyx of 4 or 5 usually imbricated sepals. Corolla wanting, or of as many petals as the sepals, deciduous. Stamens few or many. Anthers opening by apical chinks. Ovary superior, 1-celled, with 2–several parietal placentae which are sometimes well intruded. Styles as many as the placentae, but united. Ovules 2–many on each placenta. Fruit a valvate capsule, the valves bearing the placentae. Seeds numerous, often hairy. Four genera with about 20 species, of tropical regions.

Bixa Orellàna L., ANNATTO, ARNOTTO, of tropical America, occasionally grown for interest, is a shrub or small tree, up to 12° high, with glabrous, slender-petioled, ovate, entire leaves 4′–7′ long, acuminate at the apex and cordate at the base; its white or pink flowers are in terminal corymbs, with 5 deciduous sepals, 5 petals about 8″ long, many stamens and a single pistil, the ovary ripening into a 2-valved, soft-spiny, ovoid capsule about 1′ long containing many obpyramidal seeds, which yield the yellow dye.

Family 7. **FLACOURTIÀCEAE** Lindl.

FLACOURTIA FAMILY.

Trees or shrubs, with alternate estipulate petioled simple leaves, and small, often dioecious, regular flowers, mostly in axillary clusters. Sepals usually 4 or 5 and imbricated. Petals present, or wanting. Stamens hypogynous, usually numerous; anthers 2-celled. Ovary superior, 1–several-celled; style mostly short. Fruit baccate, drupaceous or capsular. About 70 genera and many species, of tropical distribution. There are no native nor naturalized species in the Bermuda Flora.

Flacourtia Ramóntchi L'Her., MADAGASCAR PLUM, GOVERNOR'S PLUM, of Madagascar, occasionally planted, is a tree up to 30° high or more, with thin, ovate to elliptic, pointed, crenate leaves 2′–3′ long, small racemose yellowish flowers without petals, mostly dioecious, and globose nearly black berry-like fruits about ½′ in diameter.

Lefroy records the introduction of *Flacourtia prunifòlia* H.B.K., of northern South America, at Mt. Langton, prior to 1877, and remarks that it did not appear to thrive; Jones also mentions it, and H. B. Small records its disappearance prior to 1901.

Aberia Cáffra Harv. & Sonder, KEI APPLE, South African, a shrub or small tree, armed with stout thorns 2′–3′ long, the obovate-cuneate, entire obtuse glabrous leaves 1½′–3′ long, the small clustered apetalous axillary flowers dioecious, the fruit depressed-globose, 1′–1½′ in diameter, has occasionally been planted.

Family 8. **VIOLÀCEAE** DC.

VIOLET FAMILY.

Herbs, shrubs, or rarely trees, with basal or alternate, simple, lobed or entire stipulate leaves and solitary or clustered, perfect, mostly irregular flowers. Sepals 5. Petals 5, hypogynous, imbricated in the bud, the lower one larger or with a posterior spur. Stamens 5; anthers erect, con-

nivent or syngenesious. Ovary simple, 1-celled, with 3 parietal placentae. Fruit usually a loculicidal capsule. Seeds anatropous. About 15 genera and 325 species, of wide distribution.

1. VÌOLA [Tourn.] L.

Acaulescent and scapose or leafy-stemmed herbs, the flowers solitary or rarely 2; early flowers petaliferous, often sterile, usually succeeded by apetalous or cleistogamous flowers which are abundantly fertile. Petals spreading, the lowermost one spurred or saccate; stamens 5, the two inferior ones spurred. Capsule 3-valved, elastically dehiscent. About 200 species, of wide distribution. Type species: *Viola odorata* L.

1. Viola odoràta L. ENGLISH OR SWEET VIOLET. (Fig. 272.) Stolons rooting at the nodes; leaves pubescent or glabrate, the blades orbicular or broadly ovate, cordate, obtuse, crenate, 1′–2′ wide; scapes equalling the foliage; flowers fragrant, 10″–20″ broad; sepals oblong, obtuse; petals beardless; capsules from cleistogamous flowers borne on short decumbent peduncles.

Occasionally escaped from gardens, where it is commonly grown. Native of Europe.

Viola trìcolor L., PANSY, HEARTS-EASE, also European in origin, is grown in flower gardens in a variety of races.



Order 23. PASSIFLORÀLES.

Herbs, tendril-bearing vines, shrubby plants, or succulent trees with a milky sap. Leaves alternate, entire or lobed. Flowers perfect, or when dioecious, the staminate and pistillate very different. Calyx of 5 more or less united sepals. Corolla of 5 distinct or partially united petals, sometimes accompanied by a fringed crown. Stamens 5 or 10 in 2 unequal rows. Ovary superior, 1-celled, with 3–5 parietal placentae. Stigmas entire, notched or forked. Fruit a berry or capsule.

Corolla not accompanied by a crown; flowers mainly dioecious, the staminate and pistillate different. Fam. 1. CARICACEAE.

Corolla accompanied by a crown (corona); flowers perfect, all alike. Fam. 2. PASSIFLORACEAE.

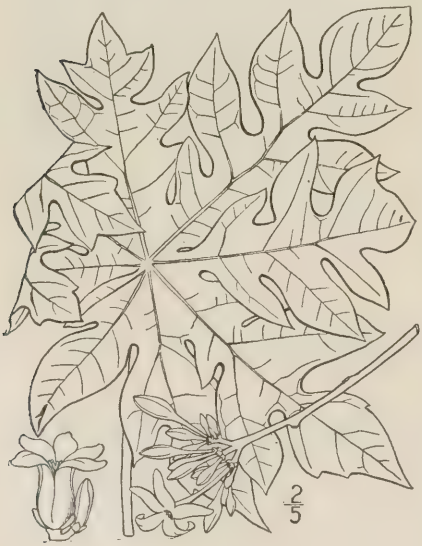
Family 1. **CARICACEAE** Dumort.

PAPAW FAMILY.

Shrubs or trees, with milky sap. Leaves ample, broad, palmately 7–9-lobed. Flowers unisexual or rarely perfect. Calyx short. Staminate flowers with a salver-shaped corolla, its tube slender, the lobes 5, valvate or convolute. Stamens 10, inserted in the throat of the corolla; filaments short; anthers adnate to the filaments, 2-celled. Pistillate flowers with 5 distinct petals and no staminodia. Ovary compound, 1-celled, or sometimes spuriously 5-celled, free, sessile; stigmas 5, sessile; ovules numerous, in two or many series on the 5 placentae. Fruit a large, fleshy berry. Seeds numerous, flattened, with a roughened testa; endosperm fleshy; embryo axile. There are two genera, the following, composed of about 25 species of tropical and subtropical distribution, and *Jacaratia* of tropical Africa and America.

1. **CARÌCA** L.

Characters of the family. [Named from the fancied resemblance of the fruit to that of the Fig.] Type species: *Carica Papaya* L.



1. Carica Papàya L. CUSTARD APPLE. PAPAW. (Fig. 273.) A small tree, with a simple wand-like stem, 8°–15° tall, leafy at the top. Leaves large, thick, suborbicular in outline, 10′–20′ broad, mostly palmately 7-lobed, pale or glaucous beneath, each lobe pinnately lobed, the segments obtuse or acute, or the larger ones acuminate; petioles stout; staminate flowers in slender panicles often 2° long; calyx of the staminate flowers about 1″ high, that of the pistillate flowers 3″–5″ high, the lobes longer than the tube; corolla yellow, that of the staminate flowers about 1′ long, its tube slender, dilated near the top, its lobes lanceolate or elliptic-lanceolate, barely one half as long as the tube; corolla of the pistillate flowers longer, the petals distinct, lanceolate, twisted; fruit oblong to subglobose, 2′–6′ long, yellow or orange, with a milky juice, often larger in cultivation.

Hillsides, waste and cultivated grounds. Naturalized. Native of the West Indies and southern Florida. Flowers in summer and autumn. Cultivated for its valuable edible fruit, from which papain is obtained. In Bermuda many staminate trees have fertile flowers below the staminate and sometimes bear small fruits abundantly. Recorded as introduced in 1616.

Family 2. **PASSIFLORÀCEAE** Dumort.

PASSION-FLOWER FAMILY.

Woody vines, climbing by tendrils, or erect herbs, with petioled usually palmately-lobed leaves, and perfect regular flowers. Calyx-tube persistent. Petals usually 5, inserted on the throat of the calyx, distinct, or in some species united. Stamens 5. Throat of the calyx crowned with a double or triple fringe. Filaments subulate or filiform, monadelphous, or separate. Ovary free from the calyx, 1-celled; placentae 3–5, parietal; styles 1–5. Fruit a berry or capsule, usually many-seeded. About 18 genera and 325 species, of warm and tropical regions, most abundant in South America.

1. **PASSIFLÒRA** L.

Climbing tendril-bearing vines, with alternate or rarely opposite leaves, and axillary flowers, on jointed, often bracted peduncles. Calyx-tube mostly cup-shaped or campanulate, 4–5-lobed, the lobes narrow, imbricated in the bud, its throat crowned with a fringe called the corona. Petals 4 or 5 (rarely none), inserted on the throat of the calyx. Ovary oblong, stalked. Filaments monadelphous in a tube around the stalk of the ovary, separate above; anthers narrow, versatile. Fruit a many-seeded berry. Seeds pulpy-arilled, flat, ovate; endosperm fleshy. [Flower of the Cross, or Passion, as emblematic of the crucifixion.] About 300 species, mostly of tropical America, a few in Asia and Australia. Type species: *Passiflora incarnata* L.

Flowers small; without an involucre or corolla; low short vine. 1. *P. suberosa.*
Flowers large; involucre of 3 bracts; long vines.
  Involucre-bracts entire. 2. *P. incarnata.*
  Involucre-bracts pectinate. 3. *P. pectinata.*

1. Passiflora suberòsa L. SMALL PASSION-FLOWER. INK BERRY. (Fig. 274.) A vine, with glabrous or pubescent foliage. Leaves ovate in outline, 2′–6′ long, ciliate, 5-nerved at the broadly cuneate or cordate base, entire, toothed, or 3-lobed to above the middle, the lobes ovate or triangular, acute or acuminate, the middle one much the larger; petioles each with 2 glands at or above the middle; peduncles surpassing the petioles, commonly in pairs; calyx greenish, 8″–12″ broad; sepals lanceolate or linear-lanceolate; corolla wanting; crown-filaments purple at the base, shorter than the sepals; berries subglobose or oval, purple to black, 4″–6″ in diameter. [*P. minima* L.]



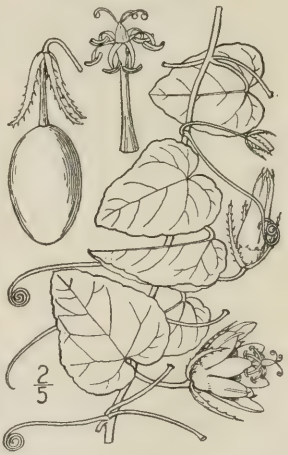
Frequent on shaded rocks, on walls and in thickets. Native. Florida and the West Indies. Flowers in summer and autumn. This is evidently the small species mentioned by Lefroy as undetermined by him.



2. Passiflora incarnàta L. PASSION-FLOWER. PASSION-VINE. (Fig. 275.) Stem glabrous, or slightly pubescent above. Petioles ½′–2′ long, with 2 glands near the summit; leaves nearly orbicular in outline, glabrous, or often somewhat pubescent, 2½′–5′ broad, somewhat cordate at the base, the lobes ovate or oval, acute or acutish, finely serrate; flowers solitary, 1¼′–2′ broad; peduncles usually 3-bracted just below the flowers; calyx-lobes linear; berry ovoid, nearly 2′ long, glabrous, yellow.

Climbing on trees near Paynter's Vale, 1905. Introduced. Native of the southeastern United States. Flowers in summer and autumn. The vines observed in 1905 had disappeared from the locality in 1912. Perhaps others exist elsewhere in Bermuda.

3. Passiflora pectinàta Griseb. PECTINATE PASSION-FLOWER. (Fig. 276.) Glabrous, high-climbing or trailing. Leaves ovate, rather firm in texture 1½′–3′ long, crenate, 5–7-nerved, somewhat contracted near the middle, cordate at the base, acute or blunt at the apex, with minute glands at the ends of the veins, the petioles 1′ long or less, eglandular; tendrils slender, as long as the leaves, or longer; flowers solitary in the upper axils, about 2½′ broad, on peduncles longer than the petioles; involucre of 3 linear, pectinate or pinnatifid bracts about 1′ long; crown about one half as long as the oblong, white sepals; fruit ellipsoid, red, slightly fleshy, about 1′ long; seeds rough. [*P. ciliata* of Lefroy and of Verrill.]



On cliffs, Walsingham and Abbot's Cliff, and on Hall's Island, Harrington Sound. Native. Bahamas. Flowers in summer and autumn. The fruits are known as "apricots." The seeds were perhaps brought to Bermuda by a bird.

Passiflora laurifòlia L., WATER LEMON, West Indian, a high-climbing species with thick entire evergreen ovate leaves, 3′–4½′ long, the short petioles 2-glandular near the base of the blade, the solitary axillary flowers about 2½′ broad, variegated, the crown violet, the edible berry ellipsoid, about 3′ long, is occasionally planted.

Passiflora coerùlea L., South American, a long glabrous vine with terete or slightly angled stems, deeply 5–7-lobed thin leaves 3′–5′ broad, their lobes oblong or oblong-lanceolate and acute, the flowers about 3′ wide, the petals white or pale rose, the white crown purplish at base and apex, the yellow berry about 1½′ long, is grown for ornament.

Passiflora maliformis L., WATER LEMON, of tropical America, mentioned by Lefroy as found in gardens, is a high-climbing, glabrous vine, with ovate thin entire acuminate leaves 3′–6′ long, the slender petioles bearing 2 round nearly flat glands; its large variegated flowers are subtended by 3 pointed membranous whitish bracts about 1′ long; the globose fruit is about 1½′ in diameter.

Passiflora quadrangularis L., GRANADILLA, tropical American, a long glabrous vine with sharply 4-angled stems, broadly ovate, entire petioled short-acuminate leaves 3′–6′ long, the petioles bearing 2 or 3 pairs of small sessile glands, the large ovate stipules membranous and acute, the axillary, involucrate flowers 3′–5′ broad with rose-colored petals and violet crown, the berry about ½′ thick, has been planted for ornament.

Passiflora édulis Sims, WATER LEMON, Brazilian, a vine with 3-lobed leaves, 3′–5′ broad, the lobes acute and irregularly serrate, the petioles with 2 glands at the apex, the axillary flowers purplish, 1½′–2′ broad, involucrate by 2 small glandular-serrate bracts, the fruit a purple oblong edible berry, about 2½′ long, is frequently planted and fruits abundantly.

Passiflora princeps Todd., a species with showy crimson flowers in long racemes, and deeply lobed leaves, was grown by Lefroy in a greenhouse at Mt. Langton, prior to 1877, and flowered profusely.

Passiflora stipulata Aubl., South American, is a long glabrous vine with angled stems, deeply 3-lobed leaves 3′–5′ broad, subcordate at the base, the foliaceous, subulate-tipped stipules ½′ long or more, the petiole with 1 or 2 sessile glands; the showy flowers are 3′–4′ broad, with rose-purple petals, the crown violet above, purple below, with 3 bands of white spots, the stamens orange. This vine is occasionally planted for ornament; its reference to *P. stipulata* Aubl. is not wholly satisfactory.

Another Passion-flower, a slender vine with deeply 5-parted leaves, their segments linear, 2′–3′ long, the slender petiole bearing 2 small, sessile glands at the middle, seen without flowers at Paget Rectory in 1914, has not been determined specifically.

Lefroy records failure in growing two species of *Tacsonia* at Mt. Langton.

Order 24. BEGONIALES.

Herbs, mostly succulent, some slightly woody, a few species climbing. Leaves alternate, entire, toothed or lobed, inequilateral; stipules 2, distinct, usually caducous. Flowers cymose, monoecious, asymmetric, cymose on axillary peduncles, bracted, mostly white or rose. Staminate flowers usually with 2 opposite sepals, the petals, when present, imbricated; stamens numerous, the anthers continuous with the filaments; ovary rudimentary or wanting. Pistillate flowers usually with 2–5 perianth-segments and without stamens; ovary commonly 3-celled; styles 2–5, commonly 2-cleft; ovules very numerous, anatropous. Fruit capsular, dehiscent, or rarely baccate. Seeds many, minute, reticulated, with little endosperm or none. Only one family.

Family 1. BEGONIACEAE Lindl.

BEGONIA FAMILY.

Two genera comprising, perhaps, 400 species, mostly of tropical regions

1. BEGÒNIA L.

A number of kinds of Begonias are grown in gardens and in greenhouses.

Begonia fuchsioìdes Hook., FUCHSIA-LIKE BEGONIA, of Northern South America, is glabrous, or nearly so, about 2° high, with small green elliptic-ovate, finely serrate leaves 1′–1½′ long, and scarlet flowers in drooping clusters.

Begonia heracleifòlia Cham. & Schl., COW-PARSNIP BEGONIA, Mexican, has palmately-lobed, long-petioled leaves 12′ broad or less, the stout petioles long-hairy, the leaf-lobes variously toothed, the long, upright peduncles bearing numerous, slender-pedicelled, white or pinkish flowers.

Begonia goegoénsis Brown, FIRE-KING BEGONIA, Sumatran, is glabrous, with long-petioled, broadly ovate, short-acuminate, entire peltate radiate-veined, usually blotched and rugose leaves 4′–7′ long, and long-peduncled clusters of pinkish flowers.

Begonia ulmifòlia Willd., ELM-LEAVED BEGONIA, of Trinidad and South America, recorded by Lefroy, is a leafy species, 2°–5° high, pubescent with brownish hairs, the obliquely elliptic, doubly serrate, pinnately-veined leaves 3′–8′ long, the white or pinkish flowers in much-branched clusters.

Begonia hydrocotylifòlia Otto, MARSH-PENNYWORT BEGONIA, Mexican, also recorded by Lefroy, is pubescent all over, with nearly orbicular, cordate, short-petioled leaves 2′ broad or less, the peduncles about 1° high, bearing rose-red flowers.

Begonia minor Jacq., JAMAICA BEGONIA, of Jamaica, a glabrous branched species 2°–4° high, with very obliquely ovate, subcordate, acuminate nearly entire leaves 2′–4′ long, and numerous white flowers in large cymes, is occasionally grown.

Begonia Réx Putz, REX BEGONIA, of Assam, has short fleshy rootstocks, differing in this feature from all the preceding species, which have fibrous roots; its long-petioled, obliquely ovate, cordate pubescent leaves are basal, green with a silvery-grey zone, and undulate-margined; its showy rose-colored flowers are 2′ broad or less.

Order 25. OPUNTIÀLES.

Fleshy plants, with continuous or jointed stems, leafless, or with small leaves (*Pereskia* has normal leaves), generally abundantly spiny, the spines developed from cushions of wool or minute bristles (areolae). Flowers mostly solitary, sessile, perfect, regular, showy. Calyx-tube adnate to the ovary, its limb many-lobed. Petals numerous, imbricated in several rows, mostly distinct. Stamens numerous, inserted on the throat of the calyx. Filaments filiform; anthers small. Ovary 1-celled; ovules numerous, anatropous, borne on several parietal placentae. Style terminal, elongated; stigmas numerous. Fruit a berry, mostly fleshy, sometimes nearly dry. Seeds smooth, or tubercled, the testa usually crustaceous or bony; endosperm little, or copious. Only one family.

Family 1. CACTÀCEAE Lindl.

CACTUS FAMILY.

Characters of the order. About 100 genera and at least 1000 species, nearly all natives of America.

Corolla rotate, without a tube; joints of the plant flat or cylindric; day-flowering. 1. *Opuntia.*

Corolla funnelform, with a long tube; joints trigonous; night-flowering. 2. *Hylocereus.*

1. OPÚNTIA Mill.

Succulent plants, with jointed branching stems, the joints flat, or cylindric, and small mostly subulate deciduous leaves, the areolae axillary, often spine-bearing. Flowers usually lateral. Calyx-tube not prolonged beyond the ovary, its lobes spreading. Petals numerous, slightly united at the base. Stamens very numerous. Ovary cylindric, exserted; style cylindric, longer than the stamens; stigma 2–7-rayed. Berry pear-shaped, often spiny. [Named from a town in Greece where some species grew.] About 200 species, natives of America. Type species: *Cactus Opuntia* L.

1. Opuntia Dillénii (Ker.) Haw. PRICKLY PEAR. (Fig. 277.) Bushy-branched, 1½°–5° high, often forming masses 6° in diameter. Joints green, glabrous, mostly obovate and 5′–10′ long, about 4″ thick, crenate, the areoles 1′–1½′ apart, somewhat elevated, bearing 1–4 stout yellow spines ½′–1½′ long, or spineless, the numerous glochides yellowish to brownish, 3″ long or less; flowers solitary at the areoles, often abundant, bright yellow, about 3′ broad; ovary obovoid, with glochide-bearing areoles; petals obovate; stamens much shorter than the petals; fruit pyriform, red-purple, edible, 2′–3′ long. [*Cactus Dillenii* Ker; *Opuntia Tuna* of Lefroy, Jones, H. B. Small, Hemsley, Verrill and Moore; *O. vulgaris* of Reade, Kemp, H. B. Small and Harshberger; *Cactus Opuntia* of Michaux.]



Common in sandy soil near the coasts, and occasional on hillsides inland. Native. Florida and the West Indies. Flowers in summer and autumn. The only native cactus. In shade, the joints greatly elongate and are proportionately narrower, sometimes 1° long and only 2½′ wide, spineless, or nearly so.

Opuntia pès-còrvi LeConte, a low, brown-spined species of Georgia and Florida, with small joints readily separating, is recorded as Bermudian by Rein and Lefroy and admitted by Hemsley and by Verrill, in all probability erroneously, as it has not been found by subsequent collectors.

Opuntia tomentòsa Salm-Dyck, TALL VELVETY PRICKLY PEAR, Mexican, is grown for interest, attaining a height of 15°–20° with a roughish trunk up to nearly a foot in diameter. A fine specimen existed in 1914, on a bank near the roadside, approaching St. George's. The joints of this species are dull green and finely velvety, and the flowers small and rose-colored.

Opuntia Ficus-índica (L.) Mill., TALL SMOOTH PRICKLY PEAR, tropical American, with large, nearly or quite smooth and often spineless joints, is occasionally grown; its oblong yellowish fruits are about 3′ long.

Opuntia leucótricha DC., AARON'S BEARD, Mexican, a tall broad-jointed species, covered with long, whitish stiff hairs, is occasionally planted for interest. Fine specimens were seen at Whitehall and Caledonia Park, St. George's, in 1913.

Several other species of *Opuntia* were planted at Mount Langton by Lefroy; in 1914 ten species were sent to Paget Rectory from the New York Botanical Garden. The plant recorded by H. B. Small as *Opuntia candelabra* has not been identified.

Nopalea cochinellífera (L.) Salm-Dyck, COCHINEEL CACTUS, a nearly smooth flat-jointed shining cactus, differing from *Opuntia* in having the stamens much longer than the small petals, is commonly grown in gardens. This plant supports the cochineel insect in tropical America, where it is abundant. [*Opuntia cochinellifera* Mill.]

Seven species of the Mexican genus **Pereskiopsis**, cacti with broad leaves, similar to *Pereskia*, were planted at Paynter's Vale in 1912 and were growing well in 1913.

2. **HYLOCÈREUS** Britton & Rose.

Climbing or trailing cacti, with 3-winged or 3-angled, mostly stout stems and branches emitting aerial roots, but bearing no leaves, the areoles borne on the wings or angles and armed with few or several short spines. Flowers nocturnal, very large, regular, the ovary and tube bearing large, ovate to linear-lanceolate scales, the perianth-segments numerous, linear or narrowly lanceolate, widely spreading, the outer green, the inner mostly bright white. Stamens very many. Fruit a scaly berry, not spiny nor bristly. [Greek, forest-cereus.] About 20 species, native of tropical America. Type species: *Hylocereus triangularis* (L.) Britton & Rose.



1. Hylocereus undàtus (Haw.) Britton & Rose. NIGHT-BLOOMING CEREUS. (Fig. 278.) Stems stout, fleshy, glabrous, sometimes 20° long, often climbing on trees, the branches 1°–4° long, green, 3-winged, the wings flat, ½′–1′ broad, coarsely crenate, their margins with a narrow horny border; spines 2–5 at each areole, brownish, 1½″–2″ long; flowers about 1° long, the tube about 1¼′ thick, rather shorter than the limb, bearing several linear-lanceolate scales 1½′–3′ long; ovary 1′–2′ long, bearing several ovate, acute scales 1′ long or less; style stout, about as long as the stamens; berry oblong, red, pulpy, about 3′ long, covered with ovate scales. [*Cereus tricostatus* Gosselin; *C. undatus* Haw.; *Cereus triangularis* of Lefroy, Reade and Jones; *Cereus compressus* of Moore.]

Banks and thickets, escaped from cultivation; common in gardens. Native of Mexico. Naturalized in Florida and the West Indies.

Selenicereus grandiflorus (L.) Britton & Rose, QUEEN OF THE NIGHT, West Indian, a climbing species, with round fluted prickly stems, its large white, bell-shaped, hairy flowers opening at night, is commonly planted. [*Cactus grandiflorus* L.]

Epiphyllum làtifrons Zucc., BROAD EPIPHYLLUM, Mexican, a large, entirely spineless flat-stemmed cactus, with large white nocturnal funnelform flowers, is occasional in gardens. [*Phyllocactus latifrons* Link.]

Cactus Melocáctus L., TURK'S CAP, Jamaican, a globose cactus a foot or more in diameter with numerous strongly spiny ribs, and a woolly top bearing small pink or rose flowers and narrowly pyriform pink fruits, is mentioned by Reade and by Lefroy as commonly grown prior to 1879, and is now occasionally seen. [*Melocactus communis* DC.]

Pereskia grandifòlia Haw., BUSH PERESKIA, South American, a spiny shrub with oval or oblong, smooth entire leaves and terminal clusters of rose-colored or purple flowers, is occasional in gardens, planted for ornament. The genus *Pereskia* differs from other Cacti in having normal leaves. [*P. Bleo* of Reade and of Lefroy.]

Pereskia Peréskia (L.) Karsten, BARBADOES GOOSEBERRY, tropical American, a high-climbing spiny vine, with similar leaves to those of the preceding species, but smaller, and large clusters of white or cream-colored fragrant flowers, followed by leafy edible yellowish berries, is also occasionally planted for ornament. [*Cactus Pereskia* L.; *P. aculeata* Mill.]

Zygocactus truncàtus (Haw.) Schumann, CRAB CACTUS, Brazilian, grown in greenhouses, is spineless, about 1° long, with flat jointed stems ½′–1′ broad, the thin, oblong joints 1½′–2′ long, united only through the middle, bearing 2 or 3 ascending, prominent teeth on both margins; the red to rose-colored, irregular flowers are about 3′ long. [*Epiphyllum truncatum* Haw.]

The following cacti were sent to Paget Rectory from the New York Botanical Garden in 1914.

Cereus lepidotus Salm-Dyck, Venezuelan.
Nyctocereus serpentinus (Lag. & Rodr.) Britton & Rose, Mexican.
Acanthocereus pentagonus (L.) Britton & Rose, Tropical American.
Cephalocereus leucocephalus (Poselg.) Britton & Rose, Mexican.
Cephalocereus Brooksianus Britton & Rose, Cuban.
Lemaireocereus griseus (Haw.) Britton & Rose, South American.
Lemaireocereus Hystrix (Salm-Dyck) Britton & Rose, West Indian.
Harrisia portoricensis Britton, Porto Rican.
Harrisia gracilis (Mill.) Britton, Jamaican.
Harrisia eriophora (Pfeiff.) Britton, Cuban.
Echinocereus enneacanthus Engelm., Texan.
Echinocactus peruvianus Schumann, Peruvian.
Mamillaria nivosa Link, West Indian.

Order 26. MYRTÀLES.

Herbs, shrubs or trees, unarmed, sometimes aquatic or amphibious. Leaves alternate or opposite. Flowers regular or irregular, complete, and often showy, or reduced to a stamen and pistil adnate to the hypanthium. Hypanthium merely enclosing the ovary or adnate to it. Stamens few or many. Anthers opening by slits or pores. Stigma terminating the style, or sessile. Fruit capsular or baccate, or resembling an achene.

Style present, simple or compound; stigma terminal.
  Anthers opening by pores. — Fam. 1. MELASTOMACEAE.
  Anthers opening by longitudinal valves.
    Hypanthium merely enclosing the ovary. — Fam. 2. LYTHRACEAE.
    Hypanthium adnate to the ovary or mainly so.
      Cotyledons spirally convolute in the embryo.
        Ovary several celled; ovules numerous, not pendulous. — Fam. 3. PUNICACEAE.
        Ovary 1-celled; ovules 2–5, pendulous. — Fam. 4. TERMINALIACEAE.
      Cotyledons not spirally convolute.
        Sepals imbricated or united and the calyx falling away as a cap. — Fam. 5. MYRTACEAE.

Sepals valvate.
Leaves stipulate; sepals leathery. Fam. 6. RHIZOPHORACEAE.
Leaves not stipulate; sepals membranous or herbaceous. Fam. 7. ONAGRACEAE.
Style wanting; stigmas sessile. Fam. 8. HALORAGIDACEAE.

Family 1. **MELASTOMÀCEAE** R. Br.

MEADOW-BEAUTY FAMILY.

Herbs, shrubs or trees, with opposite 3–9-nerved leaves, and regular perfect often showy but rarely odorous flowers. Stipules none. Calyx-tube usually 4–5-lobed, the lobes imbricated. Petals as many as the lobes of the calyx, and inserted on its throat, imbricated. Stamens twice as many, or equal in number to the petals, often inclined or declined, the alternate ones sometimes shorter. Ovary 2–several-celled (often 4-celled); style terminal, simple; ovules ∞, anatropous. Capsule included in the calyx-tube, irregularly or loculicidally dehiscent. Seeds mainly small, with no endosperm. About 150 genera and 2500 species, widely distributed in tropical regions, most abundant in South America.

Medinilla magnífica Lindl., RED MEDINILLA, of the Philippine Islands, seen at Bellevue in 1914, is a shrub with stout 4-angled branches, thick dark green, strongly 3–13-nerved, broadly ovate or elliptic, acute sessile leaves 6′–10′ long, and elegant panicles, often 1° long, of red flowers about 1′ across.

Family 2. **LYTHRÀCEAE** Lindl.

LOOSESTRIFE FAMILY.

Herbs, shrubs, or often trees in the tropics. Leaves mostly opposite, usually entire. Flowers perfect, solitary or clustered. Calyx-tube enclosing the ovary, but free; calyx-lobes mostly 4–6, commonly accompanied by accessory teeth. Corolla of 4 to 6 petals, or wanting. Filaments mostly filiform; anthers versatile. Ovary 2–6-celled, or rarely 1-celled. Styles united. Stigmas entire or rarely 2-lobed. Ovules anatropous. Fruit a thin-walled or firm capsule enclosed in the hypanthium. Seeds variously marked or roughened. Embryo straight.

Lagerstroemia índica L., QUEEN OF SHRUBS, CRAPE MYRTLE, Asiatic, grown for ornament, is a tall shrub or small tree, with rather small entire mostly opposite leaves and showy, pink or sometimes white flowers in terminal clusters; the flowers have 6 clawed crisped petals, and many long filaments; the fruit is a leathery 3–6-valved capsule. The plant blooms from spring to early autumn.

Parsonsia micropétala (H.B.K.) Britton, SMALL-PETALED PARSONSIA, Mexican, seen at Paget Rectory in 1914, is a somewhat rough shrub 2°–3½° high, with opposite petioled oblong-lanceolate leaves 2′–4′ long, or the upper alternate, smaller, and racemose leafy-bracted flowers, the tubular calyx about 1′ long, 12-nerved and 12-toothed, scarlet at base, yellow above, the 6 petals minute, the stamens red. [*Cuphea micropetala* H.B.K.]

Family 3. **PUNICÀCEAE** Horan.

POMEGRANATE FAMILY.

Shrubs or small trees, with terete branches. Leaves opposite or nearly so, entire. Flowers perfect, showy, solitary or clustered in the axils, short-peduncled. Calyx leathery, turbinate, adnate to the ovary, its lobes 5-7. Corolla of 5–7 petals inserted at the throat of the calyx-tube, wrinkled.

Stamens numerous in many series on the calyx-tube; filaments filiform; anthers versatile. Ovary several-celled, inferior; styles united; stigma slightly lobed. Ovules numerous, superposed in 2 series. Fruit a several-celled berry crowned with the calyx, with a leathery coat, its septa membranous. Seeds angled, in a watery pulp, with a leathery testa. Embryo with spirally convolute cotyledons, each auricled at the base. Only the following genus containing the one typical species and perhaps one other.

1. PÙNICA L.

Characters of the family. [Latin, from the Roman name for Carthage, where the fruit was obtained.]

1. Punica Granàtum L. POMEGRANATE. (Fig. 279.) A shrub, or a tree reaching a height of 20°. Foliage glabrous; leaves leathery, oval, elliptic or oblong, varying to broadest slightly above or below the middle, ½′–3½′ long, obtuse or acute, or rarely retuse, flat, short-petioled; peduncles stout, 1–several-flowered; calyx tube turbinate, becoming campanulate, later subglobose; lobes triangular or triangular-lanceolate, much shorter than the tube, acute, finally deciduous; petals scarlet, their blades suborbicular or orbicular-obovate, 1′ long or less, short-clawed; fruit subglobose or spheroidal, 2½′–5′ in diameter.

Commonly planted, and locally escaped from cultivation and naturalized. Native of Persia. Recorded as grown in Bermuda as early as 1621.



Family 4. TERMINALIÀCEAE J. St. Hil.

WHITE MANGROVE FAMILY.

Shrubs or trees, or vines in tropical regions. Leaves alternate or opposite, simple, leathery; stipules wanting. Inflorescence racemose or capitate. Flowers often apetalous, regular, perfect or polygamous. Calyx with 4 or 5 valvate, deciduous or rarely persistent sepals. Corolla of 4 or 5 petals, inserted at the base of the calyx, or wanting. Stamens twice as many as the petals or more; filaments distinct; anthers introrse. Ovary 1-celled; style terminal; stigma entire or nearly so. Ovules few, suspended, anatropous. Fruit drupaceous or berry-like, indehiscent, often crowned with the accrescent calyx. Seed solitary, filling the cavity; endosperm none; embryo straight, with convolute cotyledons. About 15 genera and 285 species, tropical in distribution, most abundant in the Old World.

1. CONOCARPUS L.

A shrub or tree of the seacoast, with alternate entire leathery leaves, the petioles 2-glandular, the small greenish perfect flowers in spicate or paniculate

heads. Calyx-tube flattened, not prolonged beyond the ovary; sepals 5, deciduous. Petals none. Stamens mostly 5, with slender elongated filaments and cordate anthers. Style pubescent. Ovules 2. Drupes scale-like, densely aggregated. Seeds flat; cotyledons convolute. [Greek, referring to the cone-like heads of fruit.] A monotypic American genus.



1. Conocarpus erécta L. SEA MULBERRY. BARK. BUTTONWOOD. BUTTON ALDER. (Fig. 279.) A glabrate or silky-pubescent shrub or tree, sometimes 30° tall, sometimes less than 3° high, with angled or winged twigs. Leaves 1′–2′ long, elliptic to oval, acute or acuminate at both ends, entire, short-petioled; racemes 1′–2′ long, peduncled; heads 2½″–4″ in diameter at flowering time; calyx-tube funnel-like, greenish, a little over ½″ long; sepals triangular-ovate, about as long as the limb of the calyx, finely pubescent; stamens and style 5″–7″ long; drupes scale-like, 2-winged, 2″–3½″ long. [*C. procumbens* of Reade; *Laguncularia racemosa* of Lefroy, the error copied by Verrill; *Cephalanthus occidentalis* of Jones; *Conocarpus racemosus* of Jones.]

Common along the coasts, in sheltered situations erect, where wind-swept prostrate. Native. Florida and the West Indies. Flowers in autumn and winter. Its seeds doubtless reached Bermuda by floating. Its bark was formerly used for tanning.

Terminalia Catáppa L., WEST INDIAN OR DEMARARA ALMOND, a tropical Malayan tree sometimes 50° tall, with widely spreading branches, alternate, oval to obovate, entire short-petioled leaves 6′–12′ long, slender spikes of small greenish-white flowers without petals, and elliptic 2-edged flattened drupes about 2½′ long, is occasionally planted for shade and ornament, and might well be more used.

Terminalia Arjùna Beddome, ARJUN, East Indian, a tree reaching 80° in height, with smooth bark, subopposite glabrate short-petioled oblong obtuse leaves 3′–6′ long, small flowers in panicled spikes, the obovoid-oblong, 5-winged fruits 1′–2′ long, was seen at Dunbarton in 1914, as a tree about 40° high with a trunk 20′ in circumference, raised from seed from Ceylon.

Quisqualis índica L., RANGOON CREEPER, from the Old World tropics, a long woody vine, with opposite short-stalked elliptic to oblong-lanceolate, entire acuminate leaves 3′ or 4′ long, terminal drooping spikes of elongated flowers, the very slender calyx-tube about 3′ long, its short lobes triangular, the 5 red petals oblong-oblanceolate, obtuse, 8″ or 9″ long, the leathery capsules 5-angled, is grown on walls for ornament.

Family 5. **MYRTACEAE** R. Br.

MYRTLE FAMILY.

Shrubs or trees, abounding in pungent and aromatic volatile oil. Leaves opposite, or rarely alternate or whorled, simple, pellucid-punctate. Stipules wanting. Flowers perfect, regular. Calyx with 4, 5 or many valvate or imbricated persistent sepals, or cap-like and deciduous. Petals inserted on the margin of a disk, or sometimes wanting. Stamens numerous or very rarely as many as the sepals; filaments distinct or partially united; anthers opening longitudinally. Ovary inferior or partly so, in a fleshy disk, 1–many-celled. Styles terminal or rarely lateral, united. Stigma usually terminal, entire. Ovules solitary or numerous. Fruit often crowned with the calyx. Seeds straight, often angled; testa membranous or crustaceous; endosperm wanting. A large family, consisting of about 70 genera and some 2700 species, mostly tropical.

1. **EUGÈNIA** L.

Shrubs or trees, with usually glabrous foliage. Leaves opposite, commonly leathery, pinnately veined, the flowers axillary, solitary, or in umbel-like raceme-like or congested clusters. Calyx-lobes 4 or 5. Petals 4 or 5, white. Stamens numerous; filaments filiform, distinct and in several series, or aggregated into 4 groups and slightly united. Ovary sessile, 2–3-celled. Ovules several in each cavity. Berries crowned by the calyx-lobes. Seeds often 1–4. Embryo with thick cotyledons and a short radicle. [Named in honor of Prince Eugene of Savoy (1663–1736) a patron of botany and horticulture.] About 600 species, of tropical distribution. Type species: *Eugenia uniflora* L.

Flowers glomerate in the axils, short-pedicelled; fruit black, smooth. 1. *E. axillaris.*
Flowers solitary or few together, long-pedicelled; fruit red, ribbed. 2. *E. uniflora.*

1. Eugenia axillàris (Sw.) Willd. WHITE STOPPER. (Fig. 281.) A shrub or tree, reaching a height of 20°, with a maximum trunk diameter of about 10′, the bark shallowly fissured, the branchlets terete. Leaves elliptic-ovate or nearly elliptic, unpleasantly odorous, 1½′–3′ long, revolute-margined, paler beneath than above and black-dotted; the petioles 1″–3″ long, margined; racemes cluster-like, axillary; pedicels short, pubescent; calyx-lobes 4, rounded; corolla about 2″ broad; petals 4, surpassing the calyx-lobes, glandular-punctate; fruit depressed-globose, 5″–6″ in diameter, black, smooth, glandular-punctate, sweet. [*Myrtus axillaris* Sw.; *E. monticola* of Reade, Verrill, Hemsley and Millspaugh.]



Abundant on the south side of St. David's Island and on Cooper's Island; frequent between Castle Harbor and Harrington Sound; Hall's Island; Abbot's Cliff; Boaz Island. Native, Florida and the West Indies. Flowers in summer and autumn. Its seed was probably brought to Bermuda by a bird.



2. Eugenia uniflòra L. SURINAM CHERRY. (Fig. 282.) A shrub or small tree up to 15° high, with slender branches. Leaves ovate to ovate-lanceolate, dark green and shining above, paler beneath, bluntly acute or acuminate at the apex, rounded at the base, dotted, thin in texture, 1′–2½′ long; pedicels solitary or few together, glabrous, about 1′ long; calyx-lobes obtusish; petals about twice as long as the calyx-lobes; fruit subglobose, furrowed, 4″–5″ in diameter, bright-red, spicy, edible. [*E. Michelii* Lam.; *E. Ugni* of Reade and of H. B. Small; *E. brasiliensis* of Reade?]

Thickets and hillsides. Naturalized. Native of South America. Flowers in spring. Its fruit is much used for preserves and jellies, but as it harbors the fruit fly, the tree has been largely cut out in recent years.

Eugenia floribùnda West, GUAVA-BERRY, West Indian, occasionally planted for interest and for its fruits, is a small slender tree, with short-petioled, ovate-lanceolate, acuminate leaves 1′–2½′ long, clustered, axillary or lateral, nearly sessile small white flowers and globose fruits about ¼′ in diameter.

2. PSÍDIUM L.

Trees or shrubs with pinnately-veined leaves and large axillary or lateral, solitary or clustered flowers. Calyx-tube somewhat prolonged beyond the ovary, its 4 or 5 lobes often united in the bud, irregularly parting at anthesis. Petals 4 or 5, spreading. Stamens numerous, with filiform filaments in several series. Ovary 4–5-celled; ovules several or many in each cavity. Embryo curved, with small cotyledons and a long radicle. [Greek, referring to the edible fruit.] About 100 species, the following typical.

1. Psidium Guajàva L. GUAVA. (Fig. 283.) A shrub, or a small tree sometimes 15° tall, with pubescent 4-angled branchlets. Leaves firm-leathery, oblong or nearly so, 1½′–4′ long, mostly obtuse, pubescent beneath, with prominent rib-like nerves, short-petioled; calyx-lobes 5″–7″ long, united in the bud; petals 7″–10″ long; berries globular or pyriform, 1′–2½′ in diameter. [*P. pomiferum* L.)

Commonly planted. Locally escaped from cultivation and naturalized. Native of tropical America. Flowers in summer. Its fruits much used for the well-known guava jelly.



Psidium Cattleyànum Sabine, PURPLE GUAVA, STRAWBERRY GUAVA, Brazilian, occasionally planted for its fruit, which is pulpy, purplish, globose, about 1′ long, has obovate leaves, wedge-shaped at the base, calyx-lobes separate in the bud, smaller flowers, and is a small tree with terete branches. Verrill uses the common name "Guava Berry" for this plant and cites Lefroy's record, but this name belongs to *Eugenia floribunda* West, of the West Indies. A fine plant at Paget Rectory was about 10° high in 1914, the trunk 12′ in girth.

Psidium amplexicaùle Pers. [*P. cordatum* Sims.], MOUNTAIN GUAVA, of the Virgin Islands, a shrub with orbicular subcordate short-petioled leaves, recorded by Lefroy as grown at Somerville, died some years ago.

3. PIMÉNTA Lindl.

A tree with nearly smooth bark, oblong or elliptic, petioled aromatic pinnately-veined leaves, and small white 4-parted flowers, borne in compound cymes in the upper axils. Calyx-tube campanulate, its lobes spreading, persistent. Petals spreading. Stamens numerous, in several series. Stigma peltate; ovary 2-celled; ovules mostly solitary in each cavity. Fruit berry-like, aromatic. Seeds few, subglobose; embryo spiral. [Greek, rich in oil.] A monotypic genus of the West Indies and Central America.



1. Pimenta Piménta (L.) Cockerell. ALLSPICE. PIMENTO. (Fig. 284.) Becoming 40° high or more, glabrous, except the puberulent inflorescence. Leaves coriaceous, 3′–6′ long, mostly obtuse at the apex, narrowed at the base, with petioles about ½′ long, the veins rather prominent beneath; cymes stalked, many-flowered; flowers about 3″ broad; calyx-lobes blunt; ovary puberulent; berries subglobose, about 3″ in diameter, usually 2-seeded. [*Myrtus Pimenta* L.; *P. officinalis* Lindl.; *P. vulgaris* Lindl.]

Hillsides. Very abundant in Warwick. Naturalized. Native of Jamaica, Cuba and Central America. Flowers in summer and autumn. Commonly planted.

Myrtus commùnis L., MYRTLE, SWEET MYRTLE, of southern Europe, is a shrub 3°–10° high, with opposite, nearly sessile, oblong to lanceolate-acute, aromatic leaves 1′–2½′ long, the flowers solitary in the axils on peduncles about as long as the leaves; the peduncles bear 2 narrow bractlets, and the fruit is a small black berry. It is not uncommonly planted for ornament and interest.

Amomis caryophyllàta (Jacq.) Krug & Urban, BAY OR BAY RUM TREE, West Indian, a tree up to 25° high, with leathery, elliptic to obovate, obtuse short-petioled leaves 2′–5′ long, bright green and shining above, dull beneath, finely reticulate-veined, the small white 5-parted flowers in large compound cymes, the ovoid fruits about 5″ long, is planted for ornament and for its aromatic leaves. There is a perfect specimen on the lawn at Mt. Langton. [*Myrtus caryophyllata* Jacq.; *M. acris* Sw.; *Pimenta acris* Kostel.]

Anamomis fràgrans (Sw.) Griseb., FRAGRANT ANAMOMIS, Jamaican, recorded by Jones in 1873 as grown in Bermuda, is a tree, up to 25° high, with

oval or obovate, short-petioled, rather thick leaves about 2′ long, and small, white flowers in cymes. [*Myrtus fragrans* Sw.]

Jambos Jámbos (L.) Millsp., Rose-apple, East Indian, but widely naturalized in the West Indies, is a tree up to 40° high, with firm glabrous oblong or oblong-lanceolate, acuminate, short-petioled leaves 5′–8′ long, about 1′ wide or less, and terminal corymbs of few large white flowers, with many stamens 1′–1½′ long, much surpassing the petals; its subglobose fruits are about 1′ long. This tree is occasional in gardens; the fine specimen at Par-la-Ville flowered in 1914. [*Eugenia jambos* L.; *Jambosa vulgaris* DC.]

Jambos malacénsis (L.) DC., Malay Apple, also East Indian, recorded by Lefroy as fruiting at Par-la-Ville in 1878, has broader leaves and lateral corymbs of smaller purple flowers, the top-shaped, red fruit about 4′ long. [*Eugenia malacensis* L.]

Syzygium jambolànum (Lam.) DC., Java Plum, Jambolan, of south-eastern Asia, a tree up to 50° high, with evergreen firm closely-veined, oval slender-petioled leaves 3′–6′ long, not glandular-dotted, the small white flowers in terminal panicled cymes, the 4 or 5 petals cohering in a cap, the edible berries ⅝′–¾′ long, is not uncommonly planted. Large trees were seen at Montrose and at Bellevue in 1914. [*Eugenia jambolana* Lam.]

Eucalyptus glóbulus Labill., Australian Blue Gum, Australian, commonly planted, is a tall, nearly smooth-barked tree, attaining 200° or more in its native forests. Like some other species of the genus the leaves of shoots are quite different from the mature foliage; in this, the shoot-leaves are opposite, thin, ovate, cordate-clasping or connate at the base, whitish-waxy beneath, 3′–6′ long; the later leaves are alternate, thick, petioled, narrowly lanceolate, acuminate and somewhat curved; the flowers are axillary, the obconic calyx-tube and its lid verrucose, waxy.

Eucalyptus robùsta Smith, Swamp-mahogany Gum, Australian, occasionally planted, is a tree, becoming up to 100° high, with roughish bark, its mature leaves broadly lanceolate, thick, long-acuminate, finely pinnately-veined, 5′–7′ long, their stout petioles about ½′ long; its clustered large white flowers are axillary, the calyx-lid with a conic tip.

Eucalyptus resinífera Smith, King Eucalyptus, Red Australian Gum, also planted, is tall, roughish-barked, with slender-petioled lanceolate curved acuminate leaves 4′–6′ long, small flowers and fruits, the calyx-lid conic, longer than the calyx-tube. Lefroy notes that this species resisted the wind.

Eucalyptus coriàcea Cunn., Australian White Gum, mentioned by Lefroy as making poor growth, does not appear to exist here at the present time.

Eucalyptus polyánthemos Schauer, Red Box-tree, Australian, a tree which becomes 150° high with a roughish brown bark, and has orbicular or broadly ovate, slender-petioled mature leaves 1′–2½′ broad, its small white flowers panicled, the calyx-lid short, was grown from seed at the Agricultural Station, where a quantity of young plants, about 3° high, were seen in 1913.

Eucalyptus salígna Smith, Narrow-leaved Australian Gum, seen at the Agricultural Station in 1913, has linear-lanceolate leaves with spreading veins, small, capitate flowers, the bluntly conic lid longer than the calyx-tube, the fruit about 4″ in diameter.

Eucalyptus rostràta Schlecht., Red Australian Gum, also seen at the Agricultural Station, reaches a height of 200° in Australia, has narrowly lanceolate, more or less curved leaves 5′–7′ long, with ascending veins, umbellate flowers, the usually beaked lid as long as the calyx-tube or longer, the globose fruit 2½″–3″ in diameter.

Callistemon lanceolàtus (Smith) DC., Bottle Brush, Australian, also in the collection at the Agricultural Station in 1913, is a shrub or small tree with thick lanceolate acute leaves 1′–3′ long, the showy flowers in cylindric spikes about 4′ long, the numerous red long-exserted stamens about 1′ long.

Family 6. **RHIZOPHORÀCEAE** Lindl.

MANGROVE FAMILY.

Shrubs or trees, with terete branches and usually glabrous foliage. Leaves usually opposite, leathery, with stipules. Flowers perfect, solitary in the axils or in spikes, racemes, cymes or panicles. Calyx with 3 or 4 valvate sepals. Petals as many as the sepals, 2-cleft or lacerate. Stamens twice or four times as many as the petals, or rarely of the same number, inserted at the base of a disk; filaments short or elongated; anthers 2-celled, opening lengthwise. Ovary inferior, or partly inferior, usually 2–5-celled or rarely 1-celled; styles united; stigmas sometimes lobed. Ovules 2 or rarely 4 or more in each cavity, pendulous. Fruit leathery, crowned with the calyx, indehiscent or tardily septicidal. The family consists of about 15 genera, containing some 50 species, natives of tropical and subtropical regions.

1. **RHIZÓPHORA** L.

Evergreen maritime trees, with an astringent bark, and stout pithy branchlets. Leaves opposite, entire; stipules elongated, interpetiolar, caducous. Flowers cream-colored or yellow, 2 or several on forking peduncles. Calyx-tube short, adnate to the base of the ovary, the 4 lobes leathery. Petals 4, emarginate, leathery. Stamens 4–12, alternate with the petals; filaments short. Ovary 2-celled, half-inferior, produced into a fleshy cone. Stigma 2-lobed. Ovules 2 in each cavity. Fruit pendulous, 1-celled, leathery. Seed solitary, germinating in the persistent fruit, the elongating radicle sometimes reaching the ground before the fruit falls. Endosperm wanting. [Greek, root-bearing.] Three known species, the following typical, the others natives of the Old World tropics.



1. Rhizophora Mángle L. MANGROVE. (Fig. 285.) A shrub or tree, reaching a height of 30° or more, forming impenetrable thickets by the greatly elongating radicles of the embryo and the numerous roots. Leaves 2′–6′ long, leathery, elliptic or elliptic-obovate, obtuse, with a stout midrib; petioles 2″–8″ in length; peduncles ½′–1½′ long, 2–3-flowered; pedicels stout, 2″–5″ long; bractlets scale-like; calyx-tube fleshy, turbinate or campanulate, the lobes lanceolate, about 5″ long, involute, keeled within, very firm, recurved at maturity; petals pale yellow, linear or nearly so, cleft at the tip, involute above the middle, cobwebby along the edges; anthers clustered around the style; fruit about 1′ long, curved, the radicle protruding as a narrowly clavate pendent body.

Common on the borders of salt-ponds, bays and lagoons. Native, Florida, the West Indies and tropical continental America. Flowers in summer and autumn. The plant doubtless reached Bermuda by floating. Reproductions of photographs in the great mangrove swamp at Hope Bay are published on *plates 22, 23* and *24*, Fifteenth Report Missouri Botanical Garden.

Family 7. **ONAGRÀCEAE** Dumort.

EVENING-PRIMROSE FAMILY.

Herbs, or rarely shrubs, with alternate or opposite leaves, no stipules or mere glands in their places, and generally perfect flowers. Calyx-tube adnate to the ovary, the limb 2–6-lobed (usually 4-lobed). Petals 2–9 (usually 4), convolute in the bud, rarely none. Stamens usually as many or twice as many as the petals. Ovary 1–6-celled (usually 4-celled); styles united; stigma capitate, discoid or 4-lobed; ovules generally anatropous. Fruit a capsule or small nut. Endosperm very little or none. Forty genera and about 350 species of wide geographic distribution, most abundant in America.

Calyx-tube not prolonged beyond the ovary; aquatic plants. 1. *Isnardia.*
Calyx-tube prolonged beyond the ovary; land plants.
  Stamens all of equal length. 2. *Raimannia.*
  Alternate stamens longer. 3. *Hartmannia.*

1. **ISNÀRDIA** L.

Succulent herbs, mostly glabrous, aquatic or uliginous. Stems creeping or floating; leaves opposite, relatively few, petioled. Flowers axillary, not yellow. Calyx-segments 4, shorter than the tube or slightly longer. Petals 4, small, or wanting. Filaments very short. Ovary very short; styles often almost wanting. Capsule obovoid or turbinate, straight. [In honor of Antoine Dante Isnard, a French botanist, and a member of the Academy of Sciences, died 1724.] About 4 species in Europe, Asia, continental North America, Mexico and the West Indies. Type species: *Isnardia palustris* L.

Fruit 1½″–2″ long. 1. *I. palustris.*
Fruit 3″–4″ long. 2. *I. repens.*



1. Isnardia palústris L. MARSH PURSLANE. (Fig. 286.) Stems branching, 4′–20′ long. Leaves oval, ovate or spatulate, 6″–12″ long, narrowed into slender petioles; flowers solitary, about 1″ broad; bractlets at base of the calyx usually none; calyx-lobes triangular, acute; petals small, reddish, or often wanting; capsule 4-sided, slightly longer than wide, about 1½″ high, slightly or somewhat exceeding the calyx lobes. [*Ludwigia palustris* Ell.]

Pembroke Marsh, 1905. Native. North temperate zone and Santo Domingo. Flowers from spring to autumn. Its seeds were, presumably, transported to Bermuda by a bird.

2. Isnardia répens (Sw.) DC. LARGER MARSH PURSLANE. (Fig. 287.) Stems 2° long or less, branched or simple. Leaves elliptic, oval, or obovate, 1′–2½′ long, acute or blunt at the apex, narrowed at the base into rather slender petioles; flowers solitary, sessile or short-peduncled; bractlets linear, acute, shorter than the fruiting calyx; calyx-lobes 4 or 5, sharply triangular, acute, longer than the petals; capsule 3″–4″ long, bluntly tetragonal, narrowed at the base, 3 times as long as the calyx-lobes. [*Ludwigia repens* Sw.; *L. natans* Ell.]



Frequent in fresh-water marshes. Native. Southeastern and southern United States and the West Indies. Its seeds were, presumably, bird-transported.

2. RAIMÁNNIA Rose.

Usually low caulescent herbs. Leaves alternate, sinuate or pinnatifid. Flowers yellow, axillary, or sometimes in terminal spikes, nocturnal; buds erect. Calyx-tube sometimes filiform; calyx-segments deciduous. Ovary 4-celled, elongated; ovules in 2 rows, ascending. Capsules usually narrowly cylindric, sometimes slightly tapering, spreading or ascending. Seeds terete, crowned by a tubercle. [In honor of Rud. Raimann, a monographer of this family.] About 20 species, natives of America. Type species: *Raimannia laciniata* (Hill) Rose.

Silvery-pubescent with appressed or ascending hairs: seeds striate. 1. *R. humifusa.*
Glabrous or sparingly hirsute-pubescent; seeds pitted. 2. *R. laciniata.*



1. Raimannia humifùsa (Nutt.) Rose. SEASIDE EVENING-PRIMROSE. (Fig. 288.) Spreading and decumbent, or ascending, branched from the base; stems 8′–20′ long. Leaves acutish or sometimes obtuse at the apex, ½′–2′ long, repand-denticulate, the lower pinnatifid; flowers axillary, yellow, 6″–12″ broad; calyx-lobes somewhat spreading; capsule linear, 6″–12″ long, about 1½″ thick, very pubescent; seeds striate longitudinally. [*Oenothera humifusa* Nutt.]

Sand hills and sandy shores, St. David's Island, Castle Point, near Tucker's Town and Southampton. Native Atlantic coast of the United States. Flowers in summer and autumn.



2. Raimannia laciniàta (Hill.) Rose. SINUATE-LEAVED EVENING-PRIMROSE. (Fig. 289.) Decumbent or ascending, sometimes branched, 4′–20′ high, glabrous or sparingly hirsute-pubescent. Leaves oval-lanceolate, oblong, or oblanceolate, acute or obtusish at the apex, sinuate-dentate or often pinnatifid, 1′–2′ long; flowers axillary (or on small plants sometimes solitary and terminal), 6″–15″ broad; calyx-lobes reflexed; capsule linear, 1′–1½′ long, more or less pubescent; seeds strongly pitted. [*Oenothera laciniata* Hill; *Oenothera sinuata* L.; *Oenothera sinuata hirsuta* of Moore.]

Frequent in sandy fields near the South Shores, and in cultivated lands on St. David's Island. Native. Eastern United States. Flowers in spring and summer. The seeds of this and the preceding species were, presumably, brought from the continent by birds.

Reade records one of the true Evening-primroses, under the name *Oenothera longiflora*, as not uncommon in waste land as an escape from cultivation, prior to 1883, and Lefroy also records a plant under this name, and another as *Oenothera biennis*. The genus *Oenothera* differs from *Raimannia* in habit and by having prismatic-angled seeds. None of its species have been found wild in Bermuda by recent collectors.

Oenothera Lamarckiàna Ser., LAMARCK'S EVENING PRIMROSE, a tall herb with bright yellow flowers up to 4′ broad, opening at dusk has, it is said, been grown in gardens. Reade's description of the plant observed by him might apply to this kind, and H. B. Small's record of *Oenothera longiflora* points to the same plant.

3. HARTMÁNNIA Spach.

Annual or perennial herbs with branched stems. Leaves alternate, commonly pinnatifid or lyrate; buds drooping. Flowers white, red, or purple, diurnal, in terminal spikes or racemes. Calyx-tube funnelform. Ovary elongated; ovules numerous on slender stalks, in many rows. Capsules club-shaped, 4-winged. Seeds not tuberculate. [In honor of Emanuel Hartmann, a resident of Louisiana.] About 10 species, natives of America. Type species: *Hartmannia faux-gaura* Spach.

Petals 4″–6½″ long. 1. *H. rosea.*
Petals 1′–1½′ long. 2. *H. speciosa.*

1. Hartmannia ròsea (Ait.) G. Don. ROSY PRIMROSE. (Fig. 290.) Stems slender, puberulent, erect or ascending, 8′–2° tall, branched at the base or throughout; basal leaves with oblanceolate blades 1½′–2′ long; stem-leaves often numerous, ovate-lanceolate or oblong, ½′–2′ long, obtuse or acute, entire or distantly toothed, the lower ones sometimes pinnatifid at the base; spikes much interrupted, with leaf-like bracts; calyx 3″–4½″ long; petals purple or rose, suborbicular, 4″–6½″ long, entire; capsules club-shaped, the body 2½″–5″ long, the angles winged, the faces prominently ridged, the pedicel-like base usually longer than the body. [*Oenothera rosea* Ait.]



Fields, roadsides and waste grounds. Introduced. South-central United States to South America. Flowers from spring to autumn. Erroneously recorded by Rein as *Gaura coccinea* Pursh, a very different plant of central North America, and his error copied by subsequent authors.



2. Hartmannia speciòsa (Nutt.) Small. SHOWY PRIMROSE. (Fig. 291.) Erect, ascending or decumbent, branched, 1°–3° high, puberulent or finely pubescent. Stem-leaves lanceolate or linear-lanceolate, acutish, sinuate or pinnatifid, 2′–3′ long; basal leaves oval or oval-lanceolate, repand or pinnatifid at the base; flowers white or pink, 1½′–3′ broad; petals emarginate; calyx-lobes ovate-lanceolate, about 1′ long, acuminate; capsule strongly 4-ribbed, 4-winged, pubescent, 6″–9″ long. [*Oenothera speciosa* Nutt.]

Fields and waste grounds. Introduced. Native of the southern United States and Mexico. Flowers freely in spring.

Species of **Fuchsia**, tropical American, are grown in flower-gardens, but these plants have not attained great luxuriance in Bermuda.

Family 8. **HALORAGIDÀCEAE** Kl. & Garcke.

WATER-MILFOIL FAMILY.

Perennial or rarely annual herbs, mainly aquatic, with alternate or verticillate leaves, the submerged ones often pectinate-pinnatifid. Flowers perfect, or monoecious, or dioecious, axillary, in interrupted spikes, solitary or clustered. Calyx-tube adnate to the ovary, its limb entire or 2–4-lobed. Petals small, 2–4, or none. Stamens 1–8. Ovary ovoid-oblong, or short-cylindric, 2–8-ribbed or winged, 1–4-celled; styles 1–4; stigmas papillose or plumose. Fruit a nutlet, or drupe, compressed, angular, ribed or winged, indehiscent, of 2–4 1-seeded carpels. Endosperm fleshy; cotyledons minute. Eight genera and about 100 species, of wide distribution.

1. **PROSERPINÀCA** L.

Aquatic herbs, with simple stems. Leaves alternate, lanceolate, dentate or pectinate-pinnatifid. Flowers perfect. Tube of the calyx adnate to the triquetrous ovary, the limb 3–4-parted. Petals none. Stamens 3 or 4. Styles 3 or 4, cylindric or conic-subulate, stigmatic above the middle. Fruit bony, 3–4-celled, with 1 seed in each cavity. [Middle Latin, forward-creeping.] Four known species, natives of eastern N. Am., extending to the West Indies, the following typical.



1. Proserpinaca palústris L. MERMAID-WEED. (Fig. 292.) Glabrous, simple or sometimes branched, ½°–2° long. Emersed leaves, 1′–2′ long, 1″–6″ wide, sharply serrate, the submerged ones pectinate-pinnatifid into stiff linear acute segments which are often serrulate, bearing a minute black spine in their axils; flowers solitary or several together, sessile in the axils of the emersed leaves; fruit about 2″ long, the faces concave, smooth or rugose.

In water, Pembroke and Devonshire Marshes. Native. Eastern United States. Flowers nearly throughout the year. Probably brought from the continent by a bird.

Order 27. **AMMIÀLES.**

Herbs, shrubs or trees, almost always with petaliferous flowers. Calyx-segments and petals usually 5. Stamens 4 or 5. Ovary inferior, adnate to the calyx, compound; ovule 1 in each cavity.

Stamens 5; styles 2–5, rarely united; flowers umbellate, capitate or panicled.
Fruit a fleshy berry or drupe. Fam. 1. ARALIACEAE.
Fruit dry when mature, splitting into two mericarps. Fam. 2. AMMIACEAE.
Stamens 4; style 1; stigma 1; shrubs and trees; flowers not umbellate. Fam. 3. CORNACEAE.

Family 1. **ARALIACEAE** Vent.

GINSENG FAMILY.

Herbs, shrubs or trees, with alternate or verticillate (rarely opposite) leaves, and flowers in umbels, heads, or panicles. Calyx-tube adnate to the ovary. Petals usually 5, sometimes cohering together, inserted on the margin of the calyx. Stamens as many as the petals and alternate with them (rarely more), inserted on the epigynous disk; anthers introrse. Ovary inferior, 1–several-celled; styles as many as the cavities of the ovary; ovules 1 in each cavity, pendulous, anatropous. Seeds flattened, or somewhat 3-angled, the testa thin; endosperm copious, fleshy; embryo small, near the hilum; cotyledons ovate or oblong. About 52 genera and 450 species, widely distributed. There are no native nor naturalized species in the Bermuda Flora.

Hedera Hèlix L., EUROPEAN IVY, is commonly grown on walls and on trees, and has been reported as occasionally occurring outside of cultivation. The leaves are various; the small green flowers are borne in umbels.

Gastonia cutispóngia Lam., of Mauritius, was represented by two fine trees about 18° high at Bellevue in 1914. It has pinnate leaves up to 2½° long, clustered at the ends of the branches, with thick petioles and 5 or 7 broadly ovate to elliptic, obtuse entire short-stalked leaflets 5′–8′ long; the yellowish flowers are in panicled umbels, the panicles somewhat shorter than the leaves.

Aralia Guilfoỳlei Cogn. & March., VARIEGATED ARALIA, of New Hebrides, commonly planted for ornament, is a pinnate-leaved tree, with ovate, toothed or incised, usually white-margined or blotched leaflets.

Tetrapanax papỳrifer (Hook.) K. Koch, RICE-PAPER TREE, of Formosa, seen at Cedar Lodge, in 1914, is a shrub about 5° high, which spreads freely by suckers; its nearly orbicular lobed cordate leaves are 8′–15′ broad, green above, white-cottony beneath; its small white flowers are borne in dense panicled umbels. [*Aralia papyrifera* Hook.; *Fatsia papyrifera* Benth. & Hook.]

Polyscias obtùsa (Blume) Harms, CUT-LEAVED POLYSCIAS, Javan, planted for ornament, is a small tree 10°–12° high, with glabrous bipinnately compound, slender-petioled leaves, their ultimate segments suborbicular, sharply toothed or incised, sometimes variegated. [*Panax obtusum* Blume.]

Family 2. **AMMIÀCEAE** Presl.

CARROT FAMILY.

Herbs, with alternate decompound compound or sometimes simple leaves, the petioles often dilated at the base. Stipules none, or rarely present and minute. Flowers small, generally in compound or simple umbels, rarely in heads. Umbels and umbellets commonly involucrate or involucellate. Calyx-tube adnate to the ovary, its margin truncate or 5-toothed, the

teeth seldom conspicuous. Petals 5, usually with an inflexed tip, often emarginate or 2-lobed, those of the outer flowers sometimes larger than those of the inner. Stamens 5, inserted on the epigynous disk; filaments filiform; anthers versatile. Ovary inferior, 2-celled; styles 2, filiform, persistent, often borne on a conic or depressed stylopodium; ovules 1 in each cavity, pendulous, anatropous. Fruit dry, composed of 2 carpels (mericarps), which generally separate from each other at maturity along the plane of their contiguous faces (the commissure). Fruit either flattened laterally (at right angles to the commissure), or dorsally (parallel to the commissure), or nearly terete (not flattened). Carpels after parting from each other supported on the summit of a slender axis (the carpophore), each with 5 primary ribs in their pericarps (rarely ribless), and in some genera with 4 additional secondary ones, the ribs or some of them often winged. Pericarp usually containing oil-tubes between the ribs, or under the ribs and on the commissural sides, sometimes irregularly scattered, sometimes none. Seeds 1 in each carpel; seed-coat thin; endosperm cartilaginous; embryo small, placed near the hilum. About 250 genera and probably 2000 species, of wide distribution. The mature fruit is necessary for the certain determination of most of the genera and many of the species.

Leaves simple.	
Ribs of the fruit not anastomosing.	1. *Hydrocotyle.*
Ribs of the fruit anastomosing.	2. *Centella.*
Leaves compound or decompound.	
Fruit with both primary and secondary ribs, the latter armed with hooked prickles.	3. *Torilis.*
Fruit with primary ribs only.	
Flowers yellow or greenish-yellow.	
Involucre of 2–4 linear bracts.	4. *Apium.*
Involucre none.	
Fruit terete or nearly so; leaf-segments filiform.	5. *Foeniculum.*
Fruit flattened; leaf-segments broad.	6. *Smyrnium.*
Flowers white.	
Umbels terminal.	7. *Ammi.*
Umbels, at least the lower, opposite the leaves.	
Perennials; leaf-segments broad.	8. *Celeri.*
Annuals; leaf-segments filiform.	9. *Helosciadium.*

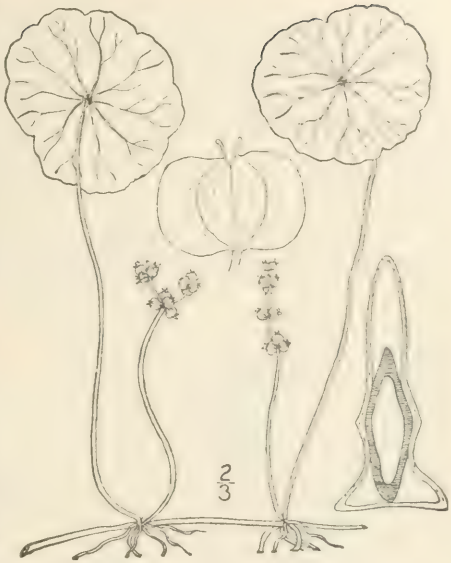
1. HYDROCOTYLE L

Perennial herbs, prostrate and commonly rooting at the joints, with palmately lobed or veined, often peltate leaves, the bases of the petioles with 2 scale-like stipules, and small white flowers in umbels opposite the leaves. Bracts of the involucre few, or none. Calyx-teeth minute. Petals entire. Disk flat. Fruit laterally compressed, orbicular or broader than high. Carpels with 5 primary ribs, the lateral ones usually curved; no large oil-tubes, but an oil-bearing layer of tissue beneath the epidermis. [Greek, water-cup.] About 75 species of wide distribution. Type species: *Hydrocotyle vulgaris* L.

1. Hydrocotyle verticillàta Thunb. WHORLED MARSH-PENNYWORT. (Fig. 293.) Inflorescence proliferous, ½′–2′ long; verticils 2–6-flowered; pedicels usually less than ½″ long; fruit about 1″ long, 1½″–2″ broad, rounded or truncate at each end; intermediate ribs not corky-thickened, the dorsal one acute.

Frequent in fresh-water marshes, and occasional near shaded borders of salt water lagoons. Native. Eastern United States and West Indies. Flowers from spring to fall.

Hydrocotyle umbellàta L., which differs in having a single umbel with slender pedicels 2″–6″ long, is recorded as Bermudian by Rein, Reade, Lefroy, H. B. Small and Hemsley, but careful search of the marshes has failed to reveal its existence in Bermuda; its leaves are scarcely distinguishable from those of *H. verticillata*, for which it may have been mistaken.



2. CENTÉLLA L.

Perennial herbs (some African species shrubby), ours with prostrate stems rooting and sending up tufts of long-petioled leaves at the nodes, together with 1–3 long-rayed umbellets of small white flowers, the true umbel sessile. Petiole-bases sheathing. Bracts of the involucels 2–4, mostly prominent. Calyx-teeth none. Disk flat, or slightly concave. Styles filiform. Fruit somewhat flattened laterally, rather prominently ribbed, the ribs mostly anastomosing; oil-tubes none. [Latin, diminutive of *centrum*, a prickle.] About 20 species, most abundant in South Africa. Type species: *Centella villosa* L.



1. Centella asiática (L.) Urban. OVATE-LEAVED MARSH-PENNYWORT. (Fig. 294.) Stem 1′–6′ long. Petioles 2′–10′ long, sometimes pubescent; blades ovate, rather thick, rounded at the apex, broadly cordate at the base, not peltate, ½′–2′ long, repand-dentate; pedicels much shorter than the leaves, ½′–2′ long; umbellets capitate, 2–4-flowered, subtended by 2 ovate bracts; flowers nearly sessile; fruit 2″–2½″ broad, about 1½″ high, prominently ribbed and reticulated. [*Hydrocotyle asiatica* L.; *H. repanda* Pers.; *Centella repanda* A. K. Small.]

Common in marshes and locally on hillsides. Native. Southeastern United States, West Indies, Old World tropics. Flowers from spring to autumn.

3. **TÓRILIS** Adans.

Annual, hispid or pubescent herbs, with pinnately decompound leaves, and compound umbels of white or reddish flowers. Calyx-teeth prominent, acute. Bracts of the involucre few and small or none. Involucels of narrow bracts. Petals mostly 2-lobed. Stylopodium thick, conic. Fruit ovoid or oblong. Primary ribs 5, filiform. Secondary ribs 4, winged, each bearing a row of barbed or hooked bristles or tubercles. Oil-tubes solitary under the secondary ribs, 2 on the commissural side. [The Greek name.] About 20 species, of the northern hemisphere. Type species: *Tordylium Anthriscus* L.

Umbels short-stalked or sessile, capitate, opposite the leaves. 1. *T. nodosa.*
Umbels peduncled, slender-rayed, compound. 2. *T. Anthriscus.*

1. Torilis nodòsa (L.) Gaertn. KNOTTED HEDGE-PARSLEY. (Fig. 295.) Decumbent and spreading. Leaves bipinnate, the segments linear-oblong, acute; rays 1–3, very short; fruit sessile, ovoid, about 1½″ long, the outer with barbed prickles on the secondary ribs, the inner with tubercles. [*Tordylium nodosum* L.; *Caucalis nodosa* Huds.]

In waste places, and cultivated ground, rather common. Naturalized. Native of Europe. Widely naturalized in the United States. Flowers in spring.





2. Torilis Anthríscus (L.) Gmel. ERECT HEDGE-PARSLEY. (Fig. 296.) Erect, 2°–3° high. Leaves bipinnate, or the uppermost simply pinnate, the segments lanceolate, obtuse, dentate or pinnatifid; umbels slender-peduncled; pedicels 1″–2″ long in fruit; rays 3–8, about 5″ long; fruit ovoid-oblong, densely bristly, about 2″ long. [*Tordylium Anthriscus* L.; *Caucalis Anthriscus* Huds.]

A weed in cultivated grounds, Agricultural Station, 1911, abundant there and observed elsewhere in Paget in 1914. Native of Europe. Adventive in the eastern United States. Flowers in spring and summer.

4. APIUM [Tourn.] L.

Annual or biennial herbs, with 1–3-pinnate leaves, and yellow or yellowish flowers in compound umbels. Calyx-teeth obsolete. Stylopodium short-conic. Fruit ovate. Carpels with 5 filiform ribs. Oil-tubes solitary in the intervals, 2 on the commissural side. A genus of 5 European species. Type species: *Apium Petroselinum* L.

Segments of basal leaves cuneate-obovate, deeply incised. 1. *A. Petroselinum*
Segments of basal leaves rhombic-obovate, dentate. 2. *A. peregrinum*.

1. Apium Petroselinum L. PARSLEY. (Fig. 297.) Usually biennial, 1°–3° high, glabrous. Leaves bipinnate, the segments ovate to cuneate-obovate, incised, or those of the upper leaves linear-oblong and entire; umbels peduncled, 1′–2½′ broad, 15–20-rayed; pedicels about 1½″ long; involucre of 2–4 linear bracts; bractlets of the involucels subulate; flowers yellow; fruit glabrous, about 2″ long, the ribs prominent. [*Petroselinum sativum* Hoffm.; *P. hortense* Hoffm.]

Extensively grown for export. Locally naturalized in moist grounds and shaded situations. Native of Europe. Flowers in spring and summer. Reade erroneously describes the flowers as white.





2. Apium peregrinum (L.) Crantz. WILD PARSLEY. (Fig. 298.) Similar to the preceding species, branched, glabrous, 2° high or less. Segments of the petioled basal leaves rhombic-ovate, 4″–7″ long, 3″–4″ wide, acute or acutish, serrate or somewhat incised; segments of the nearly sessile, few and distant upper leaves much narrower; umbels, involucre and involucels similar to those of *A. Petroselinum*, but the flowers yellowish; fruit about 2″ long. [*Ligusticum peregrinum* L.; *Petroselinum peregrinum* Lag.]

Rocky hillsides, St. Georges Island, 1908. Introduced. Native of southern Europe. Flowers in spring. Erroneously recorded as *Pimpinella Anisum* L. (Proc. Acad. Nat. Sci. Phila. 1909: 489).

5. **FOENÍCULUM** Mill.

Erect glabrous herbs, with pinnately decompound leaves, the segments linear or capillary, and compound umbels of yellow flowers. Involucre and involucels none. Calyx-teeth obsolete. Stylopodium large, conic. Fruit linear-oblong, glabrous, terete, or nearly so. Carpels little angled, dorsally flattened, prominently ribbed; oil-tubes solitary in the intervals. Seed-face flat, or slightly concave. [Latin, diminutive of foenum, hay, from its odor.] About 4 species, of the Old World, the following typical.



1. Foeniculum Foenículum (L.) Karst. FENNEL. (Fig. 299.) Perennial, 2°–4° high. Leaves dissected into capillary segments; petioles broad, clasping; umbels large, 9–25-rayed, the rays rather stout, somewhat glaucous, 1′–3½′ long in fruit; pedicels 1″–4″ long; fruit about 3″ long. [*Anethum Foeniculum* L.; *Foeniculum vulgare* Gaertn.; *F. dulce* Mill.]

Fields, marshes and waste grounds. Naturalized. Native of Europe. First grown in Bermuda as a garden herb, now widely distributed as a weed. Escaped from gardens in the United States. Flowers in summer and autumn. This is, apparently, the plant recorded by Lefroy as *Ferula communis* L.

Anethum graveòlens L., DILLWEED, MAY-WEED, also European, similar to Fennel, but annual or biennial with somewhat flattened fruit, is recorded by Lefroy as naturalized and common in his time, and is said by H. B. Small to have been a common and troublesome weed.

6. **SMÝRNIUM** [Tourn.] L.

Erect glabrous biennial herbs with ternately or biternately compound leaves, their segments broad, and compound umbels of greenish-yellow flowers, mostly without involucres or involucels. Calyx-teeth minute. Petals with inflexed tips. Stylopodium conic. Fruit ovate, often as broad as long, laterally flattened. Carpels ovoid, rather prominently 3-ribbed, the oil-tubes numerous. Seed furrowed on the inner side. [Greek, referring to the myrrh-like odor of the seeds.] About 7 species, natives of the Old World, the following typical.

1. Smyrnium Olusàtrum L. ALEXANDERS. (Fig. 300.) Stem stout, 2°–4° high. Basal and lower leaves often 1° long or more, twice or sometimes thrice ternately compound, long-petioled, the upper once ternate, short-petioled or nearly sessile; leaf-segments ovate or oval, 1′–2½′ long, obtuse or acutish at the apex, cordate to cuneate at the base, crenate and often few-lobed; umbels several–many-rayed, 2′–4′ broad, peduncled, the rays 1′–2′ long; pedicels filiform, 2″–4″ long; flowers numerous; mature fruit 2″–3″ long, the carpels strongly ribbed, black, somewhat fleshy.

Hillsides and waste grounds. Naturalized. Native of western Europe and the Mediterranean region. Flowers in spring.



7. ÁMMI [Tourn.] L.

Annual or perennial, glabrous erect branching herbs, with ternately decompound leaves, and compound umbels of white flowers. Involucre of several divided bracts. Involucels of several narrow entire bracts. Calyx-teeth minute or none. Petals dilated above. Stylopodium depressed. Style long. Fruit oblong, flattened laterally, the carpels 5-angled, the primary ribs prominent, the oil-tubes solitary in the intervals. [Name said to be of Egyptian origin.] About 7 species, natives of the Mediterranean region and the Atlantic Islands, the following typical.



1. Ammi màjus L. MAY-WEED. BISHOP'S-WEED. (Fig. 301.) Annual, 1°–2½° high. Lower leaves 4′–10′ long, ternately decompound, long-petioled, the ultimate segments oblong to oblong-obovate, obtuse or acutish, finely crenate-serrate, ½′–2′ long, ½′ wide or less; upper leaves much smaller, short-petioled or sessile, their segments narrowly linear; umbels 2′–4′ wide, the rays nearly filiform, ¾′–1½′ long; umbellets numerous, the involucel-bracts about as long as the pedicels; fruit about 1½″ long.

Common in waste and cultivated grounds. Naturalized. Native of Europe and Africa. Flowers from spring to autumn. Introduced in Texas.

8. **CÉLERI** Adans.

Annual or perennial glabrous herbs, with pinnate or pinnately compound leaves, and white flowers in compound umbels. Calyx-teeth obsolete. Petals ovate, mostly inflexed at the apex. Stylopodium depressed, or short-conic. Fruit ovate, or broader than long, smooth, or tuberculate. Carpels mostly with prominent ribs, somewhat 5-angled; oil-tubes mostly solitary in the intervals, 2 on the commissural side. Seed terete, or nearly so. [The common name.] Four or five species, natives of the Old World, southern South America and Australasia, the following typical.



1. Celeri gravèolens (L.) Britton. CELERY. (Fig. 302.) Glabrous; stem 1°–3° high. Leaves pinnate; leaf-segments 3 or 5, thin, broadly ovate to oval, coarsely toothed and often incised; umbels 3–7-rayed; involucre and involucels small, or none; flowers small, short-pedicelled; fruit oval, scarcely ½″ long, the ribs somewhat winged; oil-tubes mostly solitary in the intervals and 2 on the commissural side. [*Apium graveolens* L.]

Extensively planted along fresh water marshes, now one of the most important crops, and more or less persistent after cultivation. Native of Europe. Flowers in spring.

9. **HELOSCIÀDIUM** Koch.

Low herbs, with decompound or dissected leaves, and compound umbels of small white flowers mostly opposite the leaves. Involucre and involucels wanting in the following species. Calyx-teeth very small or obsolete. Petals entire. Stylopodium depressed. Style short. Fruit ovate or oblong, laterally compressed. Carpels with 5 filiform ribs, the oil-tubes solitary in the intervals, 2 on the commissural side. [Greek, marsh-parasol, some of the species inhabiting marshes.] Six species or more, natives of the Old World. Type species *Helosciadium nodiflorum* (L.) Koch.



1. Helosciadium Ámmi (L.) Britton. FINE-LEAVED MARSH PARSLEY. (Fig. 303.) Slender, glabrous, much branched, 5′–2° high. Leaves ternately pinnatisected, the ultimate segments narrow, often incised; umbels ½′–1½′ broad, opposite the leaves; fruit broad, glabrous, about 1″ long, the ribs equal and prominent. [*Sison Ammi* L.; *Helosciadium leptophyllum* DC.; *Apium leptophyllum* F. Muell.; *Pimpinella lateriflora* Link; *Apium Ammi* Urban.]

Cultivated and waste grounds. Naturalized. Native of tropical and warm-temperate regions. Flowers in spring. Widely naturalized in the southern United States.

Angelica Archangélica L., ANGELICA, European, has been grown in gardens; it is a biennial tall herb, with finely divided leaves, the lower with long, round stalks, which are candied; its roots are aromatic, its small white flowers in compound umbels.

Cerefolium Cerefòlium (L.) Britton, GARDEN CHERVIL, BEAKED PARSLEY, European, grown as a garden herb, has linear beaked smooth fruits, white flowers and ternately decompound leaves. [*Scandix Cerefolium* L.; *Chaerophyllum sativum* Lam.]

Anthriscus Anthríscus (L.) Karst., BUR-CHERVIL, European, is recorded by Lefroy as a common weed in his time, but it has not been found by recent collectors, and is not mentioned by Reade in his book published in 1883. It is a white-flowered plant with decompound leaves and ovoid, short-beaked, muricate fruits. [*A. vulgaris* Pers.]

Lefroy records the introduction of *Ferula glauca* as an ornamental species in 1874.

Coriandrum sativum L., CORIANDER, European, is recorded by Lefroy as quite naturalized prior to 1877 in some fields at Point Shares but it is not known to grow there at the present time, and it is not mentioned in Reade's "Plants of Bermuda" published in 1883, although Hemsley cites it from Lefroy, and H. B Small records it as not uncommon.

Daucus Caròta L., CARROT, European, is grown as a field and garden crop, but it is not naturalized as a field weed as it is on the continent.

Pastinaca sativa L., PARSNIP, European, is also grown as a field and garden crop, but not naturalized as a weed as in the United States. The flowers are yellow, the fruit flat and winged, the large pinnate leaves with ovate sessile toothed or incised segments.

Didiscus coerùleus (Graham) Hook., DIDISCUS, Australian, a roughish-hairy annual about 2° high, with ternately divided leaves and long-stalked umbels of bright blue flowers, the involucre of many, narrowly linear, pilose bracts, the flat fruits notched at base and apex, was grown at Rose Cottage in 1914. [*Trachymene coerulea* Graham.]

Family 3. **CORNÀCEAE** Link.

DOGWOOD FAMILY.

Shrubs or trees, with simple opposite, verticillate or alternate, usually entire leaves, and regular flowers in cymes, heads or rarely solitary. Calyx-tube adnate to the ovary, its limb 4–5-dentate, or none. Petals generally 4 or 5, sometimes wanting, valvate or imbricate, spreading, inserted at the base of the epigynous disk. Stamens as many as the petals or more numerous, inserted with them; filaments subulate or flat. Ovary inferior, 1–2-celled in our species; style 1, short or elongated; ovules 1 in each cavity, pendulous, anatropous. Fruit a drupe. Seeds oblong; embryo nearly as long as the endosperm; cotyledons foliaceous. About 16 genera and 85 species, most abundant in the northern hemisphere.

My only knowledge of the existence of any of this family in Bermuda, is the record by Lefroy of the introduction, prior to 1876, of a species of a North American *Cornus* at Mount Langton, which appeared to thrive and which was referred to in 1901 by H. B. Small as *Cornus stricta* Lam., and by the same author, the planting there of *Benthamia fragifera* Lindley, Himalayan, which did not appear to flourish.

Series 2. **GAMOPETALAE.**

Petals partly or wholly united, rarely separate or wanting.

The coherence of the petals is sometimes slight or they are quite separate, as in some Ericaceae, Primulaceae, Asclepiadaceae, Oleaceae and Cucurbitaceae. From this condition the coherence varies through all stages to the tubular or funnelform corollas of some Convolvulaceae, Caprifoliaceae and Compositae.

‡ *Ovary superior.*

Stamens mostly free from the corolla, or adnate merely to its base, as many as the lobes and alternate with them, or twice as many. — Order 1. ERICALES.

Stamens borne on the corolla, as many as its lobes and opposite them, or twice as many, or more.

Herbs, shrubs or trees; ovary 1-celled. — Order 2. PRIMULALES.

Shrubs or trees; ovary several-celled. — Order 3. EBENALES.

Stamens borne on the corolla, as many as its lobes or fewer, and alternate with them (in our species of *Fraxinus* and *Forestiera* of the Oleaceae there is no corolla).

Corolla not scarious, nerved.

Ovaries 2, distinct (except in some Loganiaceae, and in Gentianaceae in which the ovary is compound with 2 cavities or rarely more, or with 1 cavity and 2 placentae; flowers regular; stamens mostly adnate to only the lower part of the corolla; leaves mostly opposite. — Order 4. GENTIANALES.

Ovary 1, compound (2-divided in *Dichondra;* in Boraginaceae and Lamiaceae mostly deeply 4-lobed around the style); flowers regular or irregular; stamens mostly adnate to the middle of the corolla-tube or beyond; leaves opposite or alternate. — Order 5. POLEMONIALES.

Corolla scarious, nerveless. — Order 6. PLANTAGINALES.

‡‡ *Ovary inferior.*

Anthers distinct.

Stamens as many as the corolla-lobes and alternate with them or twice as many; ovary compound, with 1 ovule or more in each cavity; leaves opposite or verticillate. — Order 7. RUBIALES.

Stamens mostly fewer than the corolla-lobes; ovary 1-celled with 1 pendulous ovule, or 3-celled with 2 of the cavities without ovules.	Order 8. VALERIANALES.
Anthers united (except in Ambrosiaceae).	Order 9. CAMPANULALES.

Order 1. ERICALES.

Flowers complete, regular. Calyx toothed, lobed, or divided, superior, except in Vacciniaceae. Corolla mainly gamopetalous. Stamens free from the corolla, or adnate only to its base, as many as its lobes and alternate with them, or twice as many. Ovary compound.

Family 1. ERICÀCEAE DC.

HEATH FAMILY.

Shrubs, perennial herbs, or trees, with simple estipulate leaves, and mostly perfect flowers. Calyx free from the ovary, 4–5-parted or 4–5-cleft. Corolla regular, or rarely somewhat 2-lipped, usually 4–5-toothed, -lobed or -parted. Stamens hypogynous, usually as many or twice as many as the corolla-lobes, teeth or petals; anthers 2-celled, attached to the filaments by the back or base, the sacs often prolonged upwardly into tubes. Ovary 2–5-celled; stigma peltate or capitate; ovules usually numerous, anatropous. Fruit a capsule, berry or drupe. Seeds usually numerous and minute, or sometimes only 1 in each cavity; endosperm fleshy. About 60 genera and 1100 species, of wide distribution.

Lefroy records bringing an *Azalea* and a *Rhododendron* to Mount Langton and having them flower in a conservatory there. No native nor naturalized plants of the family exist in the Bermuda flora.

A species of *Erica* was growing at Wood Haven in 1914, recently planted. Soils containing much lime are not suited to plants of this family.

Order 2. PRIMULÀLES.

Herbs, shrubs or trees. Corolla usually present, gamopetalous. Calyx mostly free from the ovary. Stamens borne on the corolla, as many as its lobes, or twice as many, or more.

Style 1; fruit a capsule; herbs.	Fam. 1. PRIMULACEAE.
Styles 5; fruit an achene or utricle; herbs.	Fam. 2. PLUMBAGINACEAE.
Style 1; shrubs or trees, the fruit drupaceous.	Fam. 3. MYRSINACEAE.

Family 1. PRIMULÀCEAE Vent.

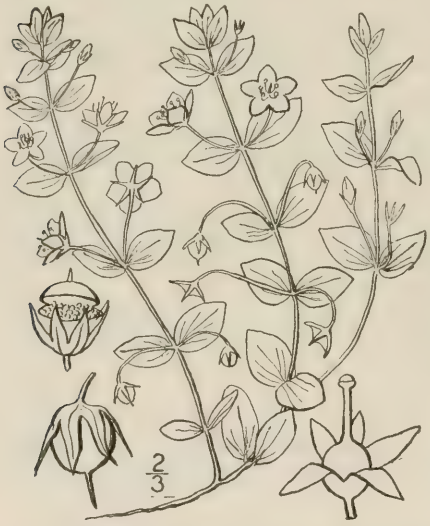
PRIMROSE FAMILY.

Herbs, with perfect regular flowers. Calyx free from the ovary, usually 5-parted. Corolla gamopetalous in our species, usually 5-cleft, deciduous. Stamens as many as the corolla-lobes and opposite them, inserted on the corolla; filaments distinct, or connate at the base; anthers introrse, 2-celled, the sacs longitudinally dehiscent. Disk obsolete, or none. Ovary superior, 1-celled; placenta central, free; ovules anatropous, or amphitropous; style

1; stigma simple, capitate, entire. Capsule 1-celled, 2–6-valved; rarely circumscissile or indehiscent. Seeds few or several, the testa adherent to the fleshy or horny copious endosperm; embryo small, straight; cotyledons obtuse. About 28 genera and 400 species, of wide distribution.

1. **ANAGÁLLIS** [Tourn.] L.

Herbs, with opposite or verticillate (rarely alternate) sessile or short-petioled leaves, entire or nearly so, and small axillary peduncled flowers. Calyx 5-parted, the lobes lanceolate or subulate, persistent. Corolla deeply 5-parted, rotate, the segments entire or erose, convolute in the bud, longer than the calyx. Stamens 5; filaments puberulent, or pubescent, distinct, or united into a narrow ring at the base; anthers oblong, obtuse. Ovary globose; ovules numerous; stigma obtuse. Capsule globose, circumscissile, many-seeded. Seeds minute, flat on the back. [Greek, delightful.] About 15 species, mostly of the Old World, the following typical.



1. Anagallis arvénsis L. Red or Scarlet Pimpernel. Poor Man's or Shepherd's Weather-glass. (Fig. 304.) Annual, diffuse; branches 4′–12′ long, 4-sided. Leaves ovate or oval, membranous, sessile or somewhat clasping, 3″–6″ long, black-dotted beneath; peduncles filiform, ½′–1¾′ long, recurved in fruit; calyx-lobes keeled, slightly shorter than the crenate glandular-ciliate corolla-segments; flowers scarlet, blue or sometimes white, usually with a darker center, 2″–3″ broad, opening only in bright weather; capsule glabrous, about 2″ in diameter.

Common in waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized in North America. Flowers from winter to summer and sparingly in autumn. The blue-flowered race is frequent on St. David's Island.

Primula sinénsis Sabine, Chinese Primrose, grown in flower-gardens, is a softly pubescent nearly or quite stemless species, with long-petioled, lobed leaves and showy flowers, umbelled on scapes, the corolla of various colors.

Family 2. **PLUMBAGINÀCEAE** Lindl.

Plumbago Family.

Perennial mostly acaulescent erect herbs, mostly with basal tufted leaves, and small perfect and regular clustered flowers. Calyx inferior, gamosepalous, 5-toothed, plaited at the sinuses, the tube 5–15-ribbed. Corolla of 5 hypogynous clawed segments connate at the base, or united into a tube. Stamens 5, opposite the corolla-segments, hypogynous; anthers 2-celled, attached by their backs to the filaments, the sacs longitudinally dehiscent. Disk none. Ovary superior, 1-celled; ovule solitary, anatropous, pendu-

lous; styles 5. Fruit a utricle or achene, enclosed by the calyx, rarely a dehiscent capsule. Seed solitary; testa membranous; endosperm mealy, or none; embryo straight; cotyledons entire. About 10 genera and 350 species, of wide distribution, mostly in saline situations.

1. **LIMÒNIUM** Adans.

Herbs, mostly perennial, and with flat basal leaves, and numerous small flowers cymose-paniculate on bracted scapes, in 1–3-flowered bracteolate clusters, forming one-sided spikes. Calyx campanulate or tubular, the limb scarious, 5-toothed, the tube usually 10-ribbed. Petals 5, clawed. Stamens adnate to the bases of the petals. Styles 5, separate in our species, stigmatic along the inner side. Fruit a utricle. [Ancient name of the wild beet.] About 120 species, widely distributed. Type species: *Statice Limonium* L.

1. Limonium caroliniànum (Walt.) Britton. Sea Lavender. Marsh Rosemary. Canker-root. (Fig. 305.) Glabrous, fleshy; rootstock thick, fusiform or branched; scape terete, striate, paniculately branched above, 1°–2½° high. Leaves oblanceolate, narrowed into margined petioles, entire, or slightly undulate, 3′–10′ long, shorter than the scapes, the midvein prominent, the lateral veins very obscure; flowers erect, about 2″ high; calyx 5-toothed, sometimes with as many minute intermediate teeth in the sinuses; corolla pale purple; petals spatulate; styles filiform. [*Statice caroliniana* Walt.; *Statice Lefroyi* Hemsl.; *Limonium Lefroyi* Britton.]



Salt marshes and borders of mangrove swamps at several points on the shores of Castle Harbor. Native. Atlantic coast of North America. Flowers in late summer and autumn. The plant probably reached Bermuda by floating.

Limonium austràle (Spreng.) Kuntze, Yellow Chinese Limonium, of China, resembling the preceding species, but with yellow flowers in dense short panicled, 1-sided spikes, was grown in flower-gardens at the Agricultural Station in 1913. [*Statice australe* Spreng.; *S. Fortuni* Lindl.]

Plumbago capénsis Thunb., Blue Plumbago, of South Africa, extensively grown for ornament, is a leafy slender half-climbing shrub, 3°–5° high with oblong to spatulate entire leaves 1′–3′ long, and large blue flowers in terminal puberulent spikes, the narrowly cylindric, glandular calyx tube about ½′ long, the slender, glabrous corolla tube about 1½′ long, the limb about 1′ broad, with 5 obovate lobes. The plant is very luxuriant in Bermuda.

Plumbago ròsea L., Red or Scarlet Plumbago, Asiatic, similar to the preceding species, but glabrous, leaves ovate-lanceolate or elliptic, and scarlet flowers in elongated spikes, the slender corolla-tube 1′ long or less, is occasionally grown for ornament. [*P. coccinea* Boiss.]

Family 3. **MYRSINÀCEAE** Lindl.

Myrsine Family.

Shrubs or trees. Leaves mostly alternate, leathery, entire, punctate; stipules none. Inflorescence racemose, corymbose, or cymose. Flowers

regular, perfect or polygamo-dioicous. Calyx persistent; sepals 4–6, rarely more. Corolla salverform or rotate, white, pink or yellowish, its tube very short, the lobes spreading, reflexed or even curled back, sometimes glandular-spotted like the sepals. Stamens 4–7, adnate to the corolla-tube or borne at the base of the corolla-lobes. Filaments sometimes forming a tube. Staminodia wanting. Gynoecium of 4–7 united carpels. Style one. Stigma capitate, truncate or somewhat foliaceous. Ovules immersed in the fleshy placenta. Fruit drupaceous, often tipped with the base of the style. Seed solitary, filling the fruit-cavity. About 20 genera containing 500 species or more, of tropical distribution. There are no native nor naturalized plants of this family in the Bermuda Flora.

Icacorea hùmilis (Vahl.) Britton, Asiatic, was established at Mount Langton by Lefroy in 1873, and a fine plant was studied there in 1913. It is a shrub, up to 6° high, with alternate coriaceous oblong to oblanceolate, short-petioled leaves 4′–6′ long, acute at each end, and small short-pedicelled greenish-purple flowers in axillary and terminal umbels, the corolla-segments lanceolate, twice as long as the calyx. [*Ardisia humilis* Vahl.]

Lefroy records the establishment, at the same place and date, of *Icacorea guianensis* Aubl. (*Ardisia acuminata* Willd.) of the southern West Indies and northern South America, and this is mentioned by Jones, but it has disappeared.

Icacorea solanàcea (Roxb.) Britton, Asiatic, seen in Devonshire Churchyard in 1912, is a shrub or small tree up to 12° high, with obovate, acuminate leaves 7′ long or less and purplish, slender-pedicelled flowers in lateral and axillary umbels. [*Ardisia solanacea* Roxb.]

Order 3. EBENÀLES.

Shrubs or trees, with alternate simple leaves, the flowers mostly regular. Calyx free from the ovary (inferior) or more or less adnate to it. Corolla gamopetalous or sometimes polypetalous. Stamens borne on the tube or base of the corolla, as many as its lobes, and opposite them, or more numerous.

Stamens as many as the corolla-lobes.	Fam. 1. SAPOTACEAE.
Stamens twice as many as the corolla-lobes, or more.	Fam. 2. EBENACEAE.

Family 1. SAPOTÀCEAE Reichenb.

SAPODILLA FAMILY.

Shrubs or trees, mostly with a milky juice. Leaves entire, mostly coriaceous and estipulate. Flowers small, regular and perfect, in axillary clusters. Calyx inferior, the sepals usually 4–7, much imbricated. Corolla gamopetalous, the tube 4–7-lobed, the lobes imbricated in the bud, sometimes with as many or twice as many lobe-like appendages on the throat. Stamens as many as the proper lobes of the corolla and inserted on its tube; staminodia usually present, alternate with the corolla-lobes; anthers 2-celled, the sacs longitudinally dehiscent. Ovary 2–5-celled, or rarely many-celled; ovules solitary in each cavity, anatropous or amphitropous; stigma simple. Fruit a fleshy berry. Seeds large, the testa bony or crustaceous; embryo straight; endosperm fleshy, or none. About 35 genera and 425 species, mostly of tropical regions. There are no native nor naturalized species in Bermuda.

Chrysophyllum Cainito L., STAR-APPLE, tropical American, occasionally planted, is a large tree with oblong or oval, petioled, pointed leaves 2′–6′ long, green above, yellow-brown and densely pubescent beneath; the small purplish or whitish flowers are in sessile axillary clusters on slender pedicels about 5″ long, the corolla deeply 5–7-lobed, the purplish globose fruit 1½′–4′ in diameter, 8–10-celled, several-seeded.

Sapota achras Mill., SAPODILLA, West Indian, also occasionally planted, is a large tree with oblong-lanceolate petioled glabrous coriaceous leaves, green on both sides, 3′–5′ long, the whitish flowers solitary in the axils, on rather stout peduncles as long as the pedicels or shorter, the 5–6-lobed corolla about as long as the pubescent sepals; the well-known fruit is a globular brown, rough-skinned berry 3½′ in diameter or less, usually containing several large black shining seeds.

Sideroxylon foetidissímum Jacq., MASTICBULLY, West Indian, a large tree, with oblong or ovate-oblong, evergreen rather thin, slender-petioled leaves 8′ long or less, the small yellowish pedicelled flowers in lateral or axillary clusters, the nearly rotate corolla 5-parted, the oval drupe nearly 1′ long, containing a single large seed, the pulp thin, grew in 1913 in a Paget garden, the only tree of this species known to me in Bermuda. [*S. masticho-dendron* Jacq.]

Calocarpum mammòsum (L.) Pierre, MAMMEE-SAPOTA, of tropical America, recorded by Jones in 1873 as "Mammee Apple," is a large tree with obovate leaves 6′–9′ long, greenish-white flowers about 6″ wide, short-pedicelled on the twigs, the rough oblong fruit 5′–6′ long, usually containing a single large seed. [*Achras mammosa* L.]

A tree of a species of *Lucuma*, about 25° high, was observed at Bellevue in 1913; it is probably *L. multiflora* A. DC., West Indian, but its fruit has not been obtained. The oblanceolate to elliptic pointed short-petioled leaves are 3′–5′ long, the axillary, short-peduncled flowers have a white fugacious tubular corolla about 3″ long.

Family 2. **EBENÀCEAE** Vent.

EBONY FAMILY.

Trees or shrubs with very hard wood, entire estipulate leaves, and dioecious polygamous or rarely perfect regular flowers, solitary or cymose in the axils. Calyx inferior, 3–7-lobed, commonly accrescent and persistent. Corolla gamopetalous, deciduous, 3–7-lobed, the lobes usually convolute in the bud. Stamens 2–3 times as many as the lobes of the corolla in the sterile flowers, and inserted on its tube, usually some imperfect ones in the pistillate flowers; anthers introrse, erect. Disk none. Ovary superior, several-celled; in the staminate flowers rudimentary or none; ovules 1–3 in each cavity, suspended; styles 2–8, distinct, or united below; stigmas terminal, sometimes 2-parted. Fruit a berry. Seeds oblong, the testa bony; endosperm copious, cartilaginous; embryo small; cotyledons large, foliaceous. About 6 genera and 275 species, mostly tropical.

1. **DIOSPÝROS** L.

Flowers lateral, cymose, racemose or solitary, the pistillate commonly solitary, the staminate usually clustered. Calyx 4–6-cleft. Corolla urceolate in our species, 4–6-lobed. Stamens 8–20 in the sterile flowers. Styles 2–6 in the pistillate flowers; ovary globose or ovoid, its cavities twice as many as the styles. Berry large, pulpy, containing 4–12 flat hard seeds. [Greek, *Zeus* wheat.] About 160 species, abundant in Asia. Type species: *D. Lotus* L.



1. Diospyros virginiàna L. PERSIMMON. DATE-PLUM. (Fig. 306.) A tree; bark hard, dark, furrowed. Leaves ovate or oval, deciduous, pubescent when young, acute or acuminate, dark green above, pale beneath, 2′–5½′ long; petioles loosely jointed with the twigs, the leaves falling away in drying; flowers mostly 4-parted; corolla greenish yellow; stamens of the sterile flowers about 16, those of the pistillate 8 or fewer; fruit globose, about 1′ long, reddish-yellow and sweet when ripe, astringent when green.

Along the border of Warwick Marsh, 1905, spreading by suckers and well established. Lefroy notes its establishment at Somerville prior to 1877 and that it became a nuisance at Mt. Langton by sending up suckers. Native of the eastern United States. It is not uncommonly planted; a tree at Somerville, now destroyed, is said to have reached 75° in height.

Diospyros káki L. f., KAKI, CHINESE PERSIMMON, Chinese, occasionally planted, is a tree which becomes 40° high under favorable conditions; it has nearly orbicular to ovate, short-petioled, often subcordate leaves 3′–5′ broad, densely pubescent beneath, its fruits 2′ in diameter, depressed-globose and yellow, the persistent calyx-lobes triangular-ovate, about 8″ long.

Diospyros díscolor Willd., MABOLO, of the Philippine Islands, was represented at Pembroke Hall in 1914, by a fine tree about 50° high. It is a narrow tall tree with somewhat pubescent young twigs; the leathery oblong sharply acute leaves are 8′–12′ long, 2′–4′ wide, the midvein prominent, the lateral veins delicate and obscure, the upper surface bright green and shining, the under side pale and dull; the fragrant flowers are in small clusters, the calyx and white corolla silky; the velvety fruit is globose, about 3′ in diameter. Lefroy notes that a plant imported by him did not thrive, but the tree at Pembroke Hall has grown luxuriantly. [*D. Mabola* Roxb.]

Diospyrus Lòtus L., LOTUS PERSIMMON, Asiatic, seen in a garden near Flatts in 1914, as a tree about 15° high, attains a height of 40° or more, has thin, sparingly pubescent, elliptic acuminate petioled leaves 2½′–4′ long, small reddish flowers about 5″ broad, and globose, nearly black fruit 6″–9″ in diameter.

Order 4. GENTIANÀLES.

Herbs, shrubs, vines or trees. Leaves opposite, or rarely alternate. Flowers regular. Corolla gamopetalous, rarely polypetalous, nerved, wanting in *Forestiera* of the Oleaceae. Stamens mostly borne on the lower part of the corolla when this is present, as many as its lobes or fewer and alternate with them. Ovaries 2, distinct, or 1 with 2 cavities (rarely more), or 2 placentae.

a. Stamens (usually 2), fewer than the corolla-lobes, or corolla none. Fam. 1. OLEACEAE.

b. Stamens as many as the corolla-lobes.
Stigmas distinct; juice not milky; ovary 1, compound.
Ovary 2-celled; leaves stipulate, or their bases connected by a stipular line. Fam. 2. LOGANIACEAE.

Ovary 1-celled, leaves not stipulate.
Stigmas united; juice milky; ovaries 2 in our species.
Styles united; stamens distinct; pollen of simple grains. Fam. 3. GENTIANACEAE.
Styles distinct; stamens mostly monadelphous; pollen-grains united into waxy masses. Fam. 4. APOCYNACEAE.
Fam. 5. ASCLEPIADACEAE.

Family 1. **OLEÀCEAE** Lindl.

OLIVE FAMILY.

Trees, vines, or shrubs (a few genera almost herbaceous) with opposite or rarely alternate simple or pinnate estipulate leaves and regular 2–4-parted flowers in panicles, cymes or fascicles. Calyx inferior, usually small, sometimes none. Stamens 2–4; filaments separate; anthers ovate, oblong or linear, 2-celled, the sacs longitudinally dehiscent. Ovary superior, 2-celled; ovules few in each cavity, anatropous or amphitropous; style usually short or none. Fruit a capsule, samara, berry or drupe. Endosperm fleshy, horny or wanting; embryo straight, rather large; radicle usually short. About 21 genera and 525 species, of wide distribution in temperate and tropical regions.

Corolla tubular with a spreading limb; fruit didymous. 1. *Jasminum.*
Corolla small or none; fruit drupaceous.
Corolla none; shrubs or trees. 2. *Forestiera.*
Corolla rotate, white; trees. 3. *Olea.*

1. **JASMÌNUM** [Tourn.] L.

Shrubs or woody vines, with mostly opposite, simple or compound leaves, and large, clustered or solitary flowers. Calyx lobed or parted. Corolla salverform, its tube cylindric, its limb lobed or parted, the lobes imbricated. Stamens 2, included; filaments short; anthers laterally dehiscent. Ovary 2-celled; style very slender; stigma capitate or 2-lobed; ovules mostly 2 in each cavity. Fruit didymous, fleshy. Seeds without endosperm. [Ancient name, of Arabic origin.] About 100 species, natives of the Old World. Type species: *Jasminum officinale* L.

1. Jasminum simplicifòlium Forst. f. SIMPLE-LEAVED JASMINE. (Fig. 307.) A glabrous woody vine, attaining a length of 30° or more, climbing on trees and forming dense thickets. Leaves opposite, simple, dark green, somewhat shining, subcoriaceous, ovate to elliptic, 1′–2½′ long, acutish or blunt at the apex, obtuse at the base faintly veined, the petioles 2″–4″ long; flowers few in terminal corymbs; pedicels slender; calyx campanulate, about 1½″ long, its teeth very short; corolla white, its tube about ½′ long, its limb star-like, 6″–8″ broad; fruits black, didymous, each of the two lobes globose, about 3″ in diameter, eaten by birds and the seeds thus scattered. [*Jasminum gracile* Andr.]



Overrunning trees and rocks nearly throughout the land between Harrington Sound and Castle Harbor, and locally elsewhere. A pernicious weed, most difficult to exterminate. Native of Australasia. Introduced about 1840. Flowers in early summer and, sparingly, in autumn, the flowers fragrant

Jasminum Sámbac (L.) Ait., ARABIAN JASMINE, East Indian, is a shrub up to 5° high, with slender, pubescent, often straggling branches, ovate entire nearly glabrous leaves 1½′–3′ long with short pubescent petioles, the white fragrant, often double flowers about ¾′ long in short terminal racemes, the calyx with about 8 linear-subulate lobes, the corolla-lobes broadly oval or nearly orbicular. It is commonly planted for ornament. [*J. calophyllum* of A. H. Moore?]

Jasminum húmile L., ITALIAN YELLOW JASMINE, of tropical Asia, is a glabrous vine-like shrub, with branches sometimes 15° long, the petioled pinnate leaves 4′–7′ long, the leaflets 3–7 (mostly 5) ovate to lanceolate, acute, short-stalked; the bright yellow flowers are in loose terminal corymbs, slender-pedicelled, the small calyx 5-toothed, the corolla about 1′ long with obtuse lobes. It is freely planted for ornament. [*J. revolutum* Sims; *J. fruticans* of Lefroy and of H. B. Small.]

Jasminum grandiflòrum L., ROYAL JASMINE, of the East Indies, also vine-like, with slender branches, petioled pinnate leaves 6′ long or less, with 5 or 7, elliptic or ovate leaflets ½′–1′ long, the lateral ones mostly obtuse and mucronate, the terminal one acute or acuminate, the loosely corymbose, slender-pedicelled, white flowers with a slender corolla-tube about 1′ long, the limb about 1′ broad, the subulate calyx-teeth about one-fourth as long as the corolla-tube, is commonly planted for ornament.

Jasminum officinàle L., POET'S JASMINE, Asiatic, similar to *J. grandiflorum* but with all the leaflets acute or acuminate, the corolla somewhat smaller and the calyx-teeth longer, is occasionally cultivated.

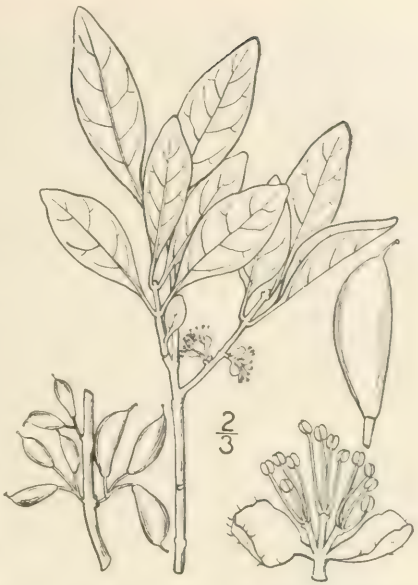
Jasminum primulìnum Hemsl., PRIMROSE JASMINE, Chinese, occasionally planted for ornament, is a slender-stemmed glabrous vine, with short-petioled, 3-foliolate leaves, the leaflets oblong or oblong-lanceolate, acute or bluntish, 1′–2½′ long, and large showy axillary and solitary flowers, about 1½′ broad, their peduncles several-bracted. The plant grows vigorously but does not flower profusely.

Jasminum undulàtum Ker, HAIRY WHITE JASMINE, of India, a climbing vine, with simple short-petioled ovate-lanceolate acuminate leaves about 2′ long, glabrous and shining above, pubescent beneath, the flowers in small terminal cymes, the linear-filiform calyx-teeth densely pubescent, the white corolla with a narrow tube about 1′ long, its narrow, acute lobes ½′–¾′ long, is occasionally planted for ornament.

2. **FORESTIÈRA** Poiret.

Shrubs or trees, the leaves opposite, deciduous, simple. Flowers inconspicuous, mainly polygamo-dioecious, in small lateral clusters or racemes on the branchlets of the preceding year. Calyx usually present but small, its tube very short, the lobes 4–6, unequal. Corolla wanting, or rarely of 1 or 2 deciduous petals. Stamens 2–4; anthers rather extrorse. Ovary 2-celled; stigmas thick, sometimes 2-lobed. Ovules 2 in each cavity, pendulous Drupe subglobose to oblong. Seeds solitary or rarely 2, the testa membranous, the endosperm fleshy. [In honor of Charles Le Forestier, a French physician.] About 15 species, natives of America. Type species: *Forestiera acuminata* (Michx.) Poiret.

1. Forestiera segregàta (Jacq.) Krug & Urban. WEST INDIAN FORESTIERA. (Fig. 308.) A glabrous shrub, or small tree, reaching a maximum height of about 20° with a trunk 6′ in diameter, usually smaller. Leaves oblong to elliptic, firm in texture, 1′–3′ long, 3″–12″ wide, variable in shape and size but those of individual bushes nearly all similar, acutish at the apex, narrowed into short petioles, copiously punctate when dry; flowers very small; corolla none; stamens yellowish; drupes oblong, slightly fleshy, about ½′ long and 2″ thick, apiculate, somewhat oblique, borne on short slender pedicels. [*Myrica segregata* Jacq.; *Forestiera porulosa* Poir.]



Rocky hillsides; very abundant on the south side of St. David's Island and on Cooper's Island; between Castle Harbor and Harrington Sound; Abbot's Cliff; Wreck Hill; Boaz Island. Native. Florida and the northern West Indies. Flowers in autumn and winter. Leaves falling in November. The largest individual observed was seen near Bailey's Bay in 1912. No local name has been found associated with this plant.

3. ÒLEA [Tourn.] L.

Trees, with opposite entire leaves, and small flowers in terminal or axillary racemes or panicles. Calyx 4-cleft or 4-toothed. Corolla nearly rotate, the tube short, the 4 lobes induplicate-valvate. Stamens 2, borne on the corolla tube, the filaments short, the anthers ovate. Ovary 2-celled; ovules 2 in each cavity; style short; stigma capitate or 2-lobed. Drupe oblong or globose, the endocarp bony. [Ancient name of the olive.] About 35 species, natives of warm-temperate and tropical regions of the Old World, the following typical.



20

1. Olea europaèa L. OLIVE. (Fig. 309.) An evergreen tree, becoming 60° high or more, with a trunk up to 3½° in diameter, the slender twigs densely leafy, angular. Leaves coriaceous, oblong or oblong-lanceolate, 1′–3′ long, 3″–6″ wide, dark green and more or less lepidote above, densely silvery-lepidote beneath, acute or obtuse and mucronulate at the apex, narrowed into short petioles; panicles axillary, shorter than the leaves; pedicels mostly shorter than the calyx; calyx broadly obconic, about 1″ long, with 4 minute teeth; corolla white, about 2½″ broad, its lobes spreading; drupe oblong or subglobose, black, shining.

Frequent on hillsides and locally naturalized, flowering in spring, its fruit, sparingly produced in Bermuda, ripe in late summer and autumn. Probably native of the Levant; widely cultivated in the Mediterranean region.

The Olive appears to have been introduced prior to 1612, being one of the first Old World trees brought to Bermuda. In 1661 the Bermuda Company ordered it widely planted, but it never became the basis of an industry. Lefroy states that some of the trees planted in 1661 were still standing about 1875; this remark may very well apply to the ancient tree still in perfect condition at Norwood, and, perhaps to one at Walsingham. The fruit produced in Bermuda is small and of inferior quality, averaging only about ½′ in length.

Fraxinus excélsior L., European Ash, of Europe and Asia, a large tree with glabrous pinnate leaves 1° long or more, the lanceolate or oblong-lanceolate, sessile serrate acuminate leaflets 9–15, the small greenish apetalous flowers in fascicled clusters, the fruit flat blunt narrowly oblong samaras ¾′–1′ long, was represented at Mount Langton in 1914 by a tree about 30° high.

Ligustrum vulgàre L., Privet, European, a shrub, with smooth dark green, indistinctly veined, lanceolate or oblong leaves 1′–2′ long, and small white perfect flowers in terminal panicles with funnelform corolla and 2 stamens, followed by small black 1–3-seeded berries, has also been introduced as a hedge plant, but does not thrive vigorously, the climate being too warm for it, or the rainfall insufficient.

Ligustrum ovalifòlium Hassk., California Privet, Japanese, a glabrous shrub up to 15° high, with upright branches, oblong or elliptic, short-petioled, somewhat shining leaves 1½′–2½′ long, narrowed at both ends, the white flowers nearly sessile in terminal panicles, the corolla-tube about 3 times as long as the limb, is successfully grown for hedges.

Ligustrum Ibòta Sieb., Ibota Privet, of China and Japan, of which a young plant was seen at Cedar Lodge in 1914, becomes, under favorable circumstances, a shrub about 10° high; its young twigs are densely pubescent, its oblong obtuse or acute leaves are 1′–2′ long, its white flowers in small drooping panicles, short-pedicelled, the corolla-tube about twice as long as the limb.

Ligustrum coriàceum Carr., Thick-leaved Privet, origin unknown, is a densely leafy, glabrous shrub, becoming 5°–6° high, with evergreen, orbicular to ovate, dark green and shining obtuse leaves 1½′–2½′ long, the flowers sessile in terminal panicles, the corolla-tube about as long as the limb; a plant apparently of this species, about 4° high, was seen at Cedar Lodge in 1914.

Osmanthus Aquifòlium Sieb., Holly Osmanthus, Japanese, a shrub or small tree, with opposite short-petioled evergreen elliptic spiny-serrate acuminate holly-like leaves 2′–4′ long, and very fragrant white flowers in axillary clusters, the blunt corolla-lobes imbricated in the bud, is grown in a few gardens.

Syringa vulgàris L., Lilac, European, seen at the Public Garden, St. George's, in 1914, is a glabrous shrub, growing up to about 9° high, with long-petioled ovate pointed leaves 2′–5′ long, the lilac or white fragrant flowers in terminal panicles, with a salverform corolla about ½′ long, the capsular fruit nearly 1′ long.

A species of *Forsythia,* Golden Bells, Asiatic, was observed in the garden at Water Ville in 1914, which did not appear to be enduring the climate.

Family 2. **LOGANIÀCEAE** Dumort.

Logania Family.

Herbs, shrubs, vines or some tropical genera trees, with opposite or verticillate simple stipulate leaves, or the leaf-bases connected by a stipular line or membrane, and regular perfect 4–5-parted flowers. Calyx inferior, the tube campanulate, sometimes short or none, the segments imbricated,

at least in the bud. Corolla gamopetalous, funnelform, campanulate, or rarely rotate. Stamens inserted on the tube or throat of the corolla; anthers 2-celled, the sacs longitudinally dehiscent; pollen-grains simple. Disk usually none. Ovary superior, 2-celled (rarely 3–5-celled); ovules anatropous or amphitropous. Fruit a 2-valved capsule in our species. Embryo small, usually straight; endosperm copious; radicle terete or conic. About 30 genera and 400 species, widely distributed in warm and tropical regions.

1. BÚDDLEIA L.

Mostly tomentose shrubs or trees, with cymose, panicled or capitate, small flowers. Calyx campanulate, 4-toothed. Corolla tubular to campanulate, its 4 lobes spreading. Stamens 4 nearly sessile. Style thickened at the apex; ovules in several series. Capsule septicidally 2-valved. Seeds numerous, oblong, with fleshy endosperm. [Commemorates Adam Buddle, an English plant-lover.] About 75 species, widely distributed in tropical regions, a few in the temperate zones. Type species: *Buddleia americana* L.

1. Buddleia madagascariénsis Lam. MADAGASCAR BUDDLEIA. (Fig. 310.) SNUFF-PLANT. A vine-like shrub 10°–15° high, with long round slender white-tomentose branches. Leaves oblong-lanceolate to ovate-lanceolate, 4′–6′ long, about 1½′ wide, acuminate at the apex, obtuse at the base, entire or very nearly so, dark green and glabrous above, densely white-tomentose beneath, the tomentose petioles 1′ long or less; flowers in terminal thyroid panicles 6′–12′ long, white-tomentose; corolla tubular, purplish, about 3″ long. [*B. Neemda* of Lefroy and of H. B. Small; *B. americana* of Reade, Jones, Verrill and Harshberger.]

Roadsides, escaped from cultivation. Native of Africa. Flowers in spring and summer.



Family 3. GENTIANÀCEAE Dumort.

GENTIAN FAMILY.

Bitter mostly glabrous herbs, with opposite (rarely verticillate) estipulate entire leaves, reduced to scales in *Bartonia*, and regular perfect flowers in clusters, or solitary at the ends of the stem or branches. Calyx inferior, persistent, 4–12-lobed, -toothed or -divided (of 2 sepals in *Obolaria*), the lobes imbricated or not meeting in the bud. Corolla gamopetalous, often marcescent, 4–12-lobed or -parted. Stamens as many as the lobes of the corolla, alternate with them, inserted on the tube or throat; anthers 2-celled, longitudinally dehiscent. Disk none, or inconspicuous. Ovary superior in our genus, 1-celled or partly 2-celled; ovules numerous, anatropous or amphitropous; stigma entire, or 2-lobed, or 2-cleft. Capsule mostly di-

hiscent by 2 valves. Endosperm fleshy, copious; embryo small, terete or conic. About 70 genera and 700 species, widely distributed.

1. CENTAÙRIUM Hill.

Herbs, mostly annual or biennial, with sessile or amplexicaul leaves, and pink white or yellow flowers in cymes or spikes. Calyx tubular, 5–4-lobed or -divided, the lobes or segments narrow, keeled. Corolla salverform, 5–4-lobed, the lobes spreading, contorted, convolute in the bud. Stamens 5 or 4, inserted on the corolla-tube; filaments short-filiform; anthers becoming spirally twisted. Ovary 1-celled, the placentae sometimes intruded; style filiform; stigma 2-lobed. Capsule 2-valved. Seed-coat reticulated. [Greek, red, the color of the flowers in some species.] About 25 species, natives of the Old World and western North and South America. Type species: *Gentiana Centaurium* L.



1. Centaurium pulchèllum (Sw.) Druce. BRANCHING CENTAURY. (Fig. 311.) Glabrous, much branched, 3′–8′ high. Leaves oval, ovate or lanceolate, the lower mostly obtuse, 3″–8″ long; no basal tuft of leaves; flowers pink, cymose-paniculate, all or nearly all of them pedicelled, 5″–6″ long; tube of the corolla 1½–2 times longer than the calyx-segments, its lobes oblong, obtuse, 1½″–2″ long; stigma oval. [*Gentiana pulchella* Sw.; *Erythraea pulchella* Fries; *E. Centaurium* of Reade, Lefroy, H. B. Small and Kemp; *E. texensis* of Hemsley.]

Frequent in waste grounds. Naturalized. Native of Europe. Naturalized in the eastern United States. Flowers from spring to autumn. Called "Wild Rice." This is, probably, the plant recorded by Michaux, in 1806, as *Gentiana nana.*

Family 4. APOCYNÀCEAE Lindl.

DOGBANE FAMILY.

Perennial herbs, shrubs, vines, or some tropical genera trees, mostly with an acrid milky juice, with simple estipulate leaves, and perfect regular 5-parted flowers. Calyx inferior, persistent, the lobes imbricated in the bud. Corolla gamopetalous, its lobes convolute in the bud and often twisted. Stamens as many as the lobes of the corolla, alternate with them, inserted on the tube or throat; anthers 2-celled; pollen-grains simple. Ovary superior, or its base adherent to the calyx, of 2 distinct carpels, or 1-celled, with 2 parietal placentae, or 2-celled; ovules anatropous or amphitropous; style simple, or 2-divided; stigma simple. Fruit usually of 2 follicles or drupes. Seeds often appendaged; endosperm fleshy; embryo straight; radicle terete, usually shorter than the cotyledons. About 130 genera and 1100 species, very widely distributed, mostly in tropical regions.

Fruit follicular; seeds comose. 1. *Nerium.*
Fruit a flattened drupe; seeds fleshy, unappendaged. 2. *Cerbera.*

1. NÈRIUM L.

Large shrubs, with whorled or opposite, entire leathery narrow leaves, and large, white to crimson flowers in terminal cymes. Calyx gland-bearing within near the base; corolla salverform with a narrowly cylindric tube, a campanulate throat, and a spreading, 5-lobed limb, the lobes dextrorsely twisted. Stamens borne at the top of the corolla-tube, included, the filaments short, the anthers sagittate, long-appendaged at the apex, connivent around the stigma, their basal lobes also appendaged. Ovary of 2 separate carpels; ovules numerous; style slender; stigma with a membranous reflexed 5-lobed ring. Follicles linear, straight, elongated. Seeds oblong, villous, appendaged by a caducous coma. [Greek, name of the Oleander, said to refer to its native habitat in moist grounds.] Two or three known species, natives of Asia and of the Mediterranean region, the following typical.

1. Nerium Oleánder L. OLEANDER. (Fig. 312.) A shrub 8°–20° high, the twigs and leaves glabrous or nearly so. Leaves opposite, or whorled in 3's, narrowly oblong-lanceolate, dull dark green above, paler green beneath, 3′–5′ long, ¼′–¾′ wide, sharply acute or acuminate at the apex, narrowed at the base into short petioles, the midvein prominent beneath, the lateral veins very many, transverse; cymes several–many-flowered, somewhat pubescent; flowers scarcely odorous; calyx pubescent, about 4″ long; corolla 1¼′–2′ broad, often double ,white to purple; pods 4′–7′ long, about 4″ thick, drooping.



In nearly all situations except saline ones. Naturalized. Native of the Orient. Recorded as introduced to Bermuda in 1790, now one of its most beautiful floral features, blooming more or less throughout the year, most freely in spring and summer.

Catharanthus róseus (L.) G. Don., RED PERIWINKLE, a somewhat woody, herbaceous plant about 2° high, with smooth opposite entire leaves, and large pink, or sometimes white, axillary flowers, the corolla salverform, the cylindric pubescent follicles about 1′ long, is common in flower-gardens. It is native of the Old World tropics, and naturalized in Florida, the West Indies and tropical continental America. [*Vinca rosea* L.]

2. CÉRBERA L.

Glabrous trees or shrubs, with alternate narrow often apparently 1-nerved leaves, and large yellow flowers in terminal cymes. Calyx 5-parted glandular within at the base. Corolla funnelform, the tube cylindric below, abruptly enlarged into a campanulate throat, the spreading limb 5-lobed, the

broad lobes somewhat twisted. Stamens borne at the top of the corolla-tube; anthers lanceolate, unappendaged. Ovary 2-lobed, 2-celled; ovules 2 in each cavity; style filiform; stigma disk-like. Drupe flattened, broader than long, the bony endocarp 2-celled. [Named for Cerberus, the fabled watch dog of the infernal regions.] Seven species or more, natives of tropical regions, the following typical.



1. Cerbera Thevètia L., FRENCH TRUMPET-FLOWER. LUCKY-NUT. (Fig. 313.) A small tree, or shrub, up to 20° in height, its branches densely leafy. Leaves linear, dark green and shining above, pale green beneath, 3′–6′ long, 3″–5″ wide, attenuate at both ends, the mid-vein prominent beneath, the lateral venation very obscure; cymes several-flowered; pedicels slender; calyx-segments lanceolate, acuminate, spreading, about 3″ long; corolla 2½′–3′ long, the cylindric part 6″–8″ long; drupe compressed-triangular, 1′–1¼′ broad, about ¾′ high and ½′ thick, the flesh thin. [*Thevetia nereifolia* Juss.]

Frequently escaped from gardens and plantations where it is common. Native of the West Indies. Flowers during most of the year.

Plumiera álba L., WHITE TRUMPET-FLOWER, West Indian, was represented in 1913 by a very old tree about 30° high, at Pembroke Hall. It has linear to linear-oblong leaves 4′–10′ long, densely white-tomentulose and reticulate-veined beneath, and terminal cymes of white flowers 1′ broad or more, the corolla with a yellow eye.

Plumiera rùbra L., FRANGIPANNI, RED JASMINE, frequently planted for ornament, is a tree up to 15° high, abounding in milky sap, with very stout twigs; the large oblong leaves are 3′–8′ long and clustered at the ends of the twigs; the pink to red flowers are in terminal cymes, the corolla about 2′ broad with oval lobes longer than the tube, the follicles about 6′ long.

Allamanda Héndersoni Bull, HENDERSON'S ALLAMANDA, South American, a high-climbing woody vine, occasionally planted for ornament, is glabrous, the leaves whorled in 4's, elliptic to oblong, 3′–5′ long, short-petioled, narrowed at the base and acuminate at the apex; the showy bright orange-yellow flowers are about 4′ broad, the corolla with a slender tube, its throat spotted.

Allamanda Schóttii Pohl, SCHOTT'S ALLAMANDA, also South American, mentioned by Lefroy as grown under glass at Mt. Langton, is similar, but slightly pubescent with lanceolate leaves, the corolla-throat striped.

Tabernaemontana coronària (Jacq.) Willd., CRAPE JASMINE, origin unknown, a glabrous shrub, with thin bright green opposite short-petioled elliptic to oblong-lanceolate, acuminate leaves 3′–6′ long, and cymose white, usually double flowers about 1½′ broad, is frequently planted for ornament. [*Nerium coronarium* Jacq.]

Tabernaemontana citrifòlia Jacq., SMALL-FLOWERED TABERNAEMONTANA, West Indian, a shrub up to 6° high, with oblong or oblong-obovate leaves 3′–5′

long, white flowers about 8″ broad, in terminal compound cymes, the corolla-lobes about as long as the tube, is recorded by Lefroy as common in gardens prior to 1877.

Tabernaemontana Cumingiàna A. DC., of the Philippine Islands, a shrub up to 5° high, with elliptic-lanceolate or oblong leaves 2′–5′ long, narrowed at both ends, few-flowered cymes of white flowers in the upper axils, the slender corolla-tube 7″–9″ long, longer than the lobes, was represented at Mt. Langton by a vigorous plant in 1913.

Arduina grandiflòra E. Meyer, Natal Plum, South African, a glabrous shrub 5° high or higher, with strong forked spines 1′–2′ long, thick ovate entire mucronate short-petioled leaves 1′–3′ long; few-flowered terminal cymes, the white corolla with a short tube and 5 oblong lobes about 1′ long overlapping to the left, the ovoid pointed red berry 1′–2′ long, is planted for ornament and for its edible fruit. It is a good hedge-plant with fragrant flowers.

Trachelospermum divaricàtum (Thunb.) K. Schum., Star Jessamine, Chinese, a pubescent woody climbing vine up to 15° long, with oval or elliptic, short-petioled, acute or short-acuminate leaves 2′–3′ long, and axillary cymes of white or pinkish flowers about 1′ broad, the linear follicles 4′–7′ long, is occasionally planted for ornament. [*T. jasminoides* Lemaire.]

Beaumontia grandiflòra Wall., Beaumontia, East Indian, occasionally planted for ornament, is a woody vine with opposite short-petioled elliptic to obovate leaves 6′–8′ long, the apex abruptly acuminate, and very large white fragrant clustered flowers, the 5 ovate acute sepals about 1′ long, the campanulate, 5-lobed corolla 4′–5′ long.

Family 5. **ASCLEPIADÀCEAE** Lindl.

Milkweed Family.

Perennial herbs, vines or shrubs, mostly with milky juice, with estipulate leaves, and mostly umbellate perfect regular flowers. Calyx inferior, its tube very short, or none, its segments imbricated or separate in the bud. Corolla campanulate, urceolate, rotate or funnelform, 5-lobed or 5-cleft, the segments commonly reflexed. A 5-lobed or 5-parted crown (corona) between the corolla and the stamens and adnate to one or the other. Stamens 5, inserted on the corolla; filaments short, stout, mostly monadelphous, or distinct; anthers attached by their bases to the filaments, introrsely 2-celled, connivent around the stigma, or more or less united with each other; anther-sacs tipped with an inflexed or erect scarious membrane, or unappendaged at the top, sometimes appendaged at the base; pollen coherent into waxy or granular masses, one or rarely two such masses in each sac, connected with the stigma in pairs or fours, by 5 glandular corpuscles alternate with the anthers. Disk none. Ovary of 2 carpels; styles 2, short, connected at the summit by the peltate discoid stigma; ovules numerous in each carpel, mostly anatropous, pendulous. Fruit of 2 follicles. Seeds compressed, usually appendaged by a long coma; endosperm cartilaginous; embryo nearly as long as the seed; cotyledons flat. About 220 genera and 2000 species, of wide distribution.

Corona-hoods with an incurved horn. 1. *Asclepias.*
Corona-hoods hornless. 2. *Gomphocarpus.*

1. ASCLÉPIAS L.

Perennial herbs with entire leaves, and middle-sized or small flowers in umbels. Calyx 5-parted or 5-divided, usually small, the segments or sepals acute, often glandular within. Corolla deeply 5-parted, the segments mostly valvate, reflexed in anthesis. Corona-column generally present. Corona of 5 concave hoods, each bearing within a slender or subulate incurved horn. Filaments connate into a tube; anthers tipped with an inflexed membrane, winged, the wings broadened below the middle; pollen-masses solitary in each sac, pendulous on their caudicles. Stigma nearly flat, 5-angled or 5-lobed. Follicles usually thick, acuminate. Seeds comose in all but one species. [Dedicated to Æsculapius.] About 95 species, mostly natives of the New World. Type species: *Asclepias syriaca* L.



1. Asclepias curassávica L. Wild Ipecac. Blood-flower. Butterfly Weed. (Fig. 314.) Stems somewhat woody at the base, glabrous or minutely pubescent above, 1°–3° high; leaves opposite, 2′–6′ long, oblong to oblong-lanceolate, commonly acuminate; umbels terminal and lateral, 5–10-flowered; pedicels 5″–10″ long; corolla-lobes deep red-purple, about 3″ long, ovate-oblong; column distinct; hoods orange, erect, 2″ high, ovate, obtuse, laterally compressed, shorter than the flat attenuate curved horn; follicles erect on erect fruiting pedicels, 1½′–4′ long, slender-fusiform, acuminate, glabrous or minutely pubescent and slightly glaucous; seeds 3″ long, rather thin; coma 1″–1½″ long.

Common in waste and cultivated grounds. Naturalized. Native of tropical America. Naturalized in the southern United States. Flowers in summer and autumn.

Asclepias nívea L., White Milkweed, West Indian, which is similar to *A. curassavica* but has white corollas and usually broader leaves, came up in some soil from the West Indies at Mount Langton, as recorded by Lefroy, who states that it established itself at that time, but it has not been observed subsequently, and H. B. Small indicates that it did not persist.

Asclepias Linària Cav., Ranstead Milkweed, Mexican, a white-flowered, narrow-leaved species, was in cultivation in gardens, prior to 1883, according to Reade.

2. GOMPHOCÁRPUS R. Br.

Shrubs or large herbs, with opposite leaves, the flowers similar in structure to those of *Asclepias*, but the hoods of the corona without horns, unappendaged. Follicles inflated. [Greek, club-fruit.] About 75 species, mostly African. Type species: *Asclepias arborescens* L.



1. Gomphocarpus physocárpus E. Meyer. LARGE-FRUITED GOMPHOCARPUS. (Fig. 315.) Shrubby, branched, pubescent above, 4°–6° high, rather densely leafy. Leaves thin, linear-lanceolate, short-petioled, acuminate at the apex, narrowed at the base, 2′–4′ long, ½′ wide or less; umbels few, several-flowered; pedicels very slender, puberulent, 1′–1½′ long; corolla white, about ½′ broad, its ovate, acutish segments soon reflexed; follicles ovoid, about 2′ long, 1′–1½′ thick, loosely covered with weak slender processes about 3″ long. [*Asclepias physocarpa* Schlechter.]

Roadside, St. David's Island, 1909. Flowers in spring. Native of South Africa. Naturalized in Jamaica.

Hoya carnòsa R. Br., WAX-PLANT, of tropical Asia and Australia, occasionally planted in gardens and grown luxuriantly under glass, is a vine with thick fleshy entire ovate leaves, and umbelled fragrant flowers, the white rotate corolla with a crown spreading like a star; the fruits are smooth follicles.

Stephanotis floribùnda A. Brongn., STEPHANOTIS, Madagascan, is an elegant high-climbing, glabrous vine, with thick shining elliptic petioled leaves 2′–4′ long, and large white fragrant flowers in stalked axillary umbels, the short calyx 5-parted, the salverform corolla 1′–2′ long, with 5 spreading lobes and a crown of 5 scales, the fleshy pod about 4′ long; it is commonly planted on walls and grows luxuriantly. [*Marsdenia floribunda* Schlechter.]

Stapelia maculòsa (Haw.) Donn, CARRION-FLOWER, South African, occasionally grown for interest, is a fleshy leafless plant 3′–4′ high, the stems 4-angled, the stalked purplish mottled flowers 3′–4′ wide, their odor very offensive. [*Orbaea maculosa* Haw.]

Cryptostegia grandiflòra R. Br., CRYPTOSTEGIA, a woody vine, containing much milky sap, and yielding some india rubber, grown at Wood Haven in 1914, has oblong entire thickish leaves 3′–4′ long, and large purplish flowers, the corolla about 2′ broad with a corona of 5 scales deep down in its tube.

Order 5. POLEMONIÀLES.

Mostly herbs; rarely shrubs or trees. Corolla almost always gamopetalous, regular or irregular. Stamens adnate to the corolla-tube usually to the middle or beyond, as many as the corolla-lobes, or fewer and alternate with them. Ovary 1, superior, compound (in Boraginaceae and Lamiaceae deeply 4-lobed around the style).

a. Corolla regular.

Ovary not 4-lobed, the carpels not separating as distinct nutlets at maturity
Ovary 2-celled, rarely 3–4-celled; style 1, entire, 2-cleft, or 2-parted; mostly twining vines. Fam. 1. CONVOLVULACEAE
Ovary 2–4-celled. Fam. 2. DICHONDRACEAE
Ovary 2-divided. Fam. 3. POLEMONIACEAE
Ovary 3-celled; stigmas 3, linear.

Ovary 1-celled; style 1, 2-lobed, or 2-parted; herbs not twining. Fam. 4. HYDROPHYLLACEAE.
Ovary deeply 4-lobed around the style, or not lobed (*Heliotropium*).
Style arising from between the ovary-lobes. Fam. 5. BORAGINACEAE.
Ovary not lobed; styles terminal. Fam. 6. EHRETIACEAE.

b. Corolla irregular, more or less 2-lipped (regular in Solanaceae, in *Mentha* of the Lamiaceae, and nearly or quite so in *Verbena* and *Callicarpa* of the *Verbenaceae*).

1. Carpels 1–2-seeded.

Ovary not lobed, 2–4-celled, the style apical; carpels separating into 1-seeded nutlets. Fam. 7. VERBENACEAE.
Ovary 4-lobed around the style, the lobes ripening into 1-seeded nutlets. Fam. 8. LAMIACEAE.

2. Carpels several–many-seeded (2-seeded in some Acanthaceae).

‡ Fruit a berry, or more commonly a capsule which is 1–2-celled, 2-valved, circumscissile, or irregularly bursting, not elastically dehiscent.
Placentae axile.
Flowers regular; fertile stamens 5 (4 in *Petunia*); fruit a berry or capsule. Fam. 9. SOLANACEAE.
Flowers more or less irregular; fertile stamens 2 or 4 (5 in *Verbascum*); fruit a capsule. Fam. 10. SCROPHULARIACEAE.
Placentae parietal.
Trees, shrubs, or woody vines; capsule 2-celled. Fam. 11. BIGNONIACEAE.
Herbs or shrubs; capsule 1-celled. Fam. 12. GESNERIACEAE.

‡‡ Capsule completely 2-celled, elastically loculicidally dehiscent; opposite-leaved herbs; placentae axile. Fam. 13. ACANTHACEAE.

3. Ovary 2-celled with 1 ovule in each cavity; trees or shrubs with alternate leaves. Fam. 14. MYOPORACEAE.

4. Ovary and fruit 1-celled with 1 erect orthotropous ovule and seed; herb with spicate flowers and reflexed fruits. Fam. 15. PHRYMACEAE.

Family 1. **CONVOLVULÀCEAE** Vent.

MORNING-GLORY FAMILY.

Herbs or vines, some tropical species shrubs or trees, with alternate estipulate leaves, and regular perfect axillary cymose or solitary flowers. Calyx inferior, 5-parted or 5-divided, usually persistent, the segments or sepals imbricated. Corolla gamopetalous, the limb 5-angled, 5-lobed or entire. Stamens 5, inserted low down on the tube of the corolla and alternate with its lobes, all anther-bearing, the filaments filiform, or dilated at the base; anthers 2-celled, the sacs longitudinally dehiscent. Disk annular or none. Ovary superior, sessile, 2–3-celled, with 2 ovules in each cavity, or falsely 4–6-celled with a single ovule in each cavity, entire or 2–4-divided; styles 1–3, terminal, or arising from between the ovary-divisions; ovules anatropous. Fruit a 2–4-valved capsule or of 2–4 distinct carpels, in our species. Seeds erect, the testa villous, pubescent or glabrous; embryo plaited or crumpled; cotyledons foliaceous; endosperm fleshy or cartilaginous, usually scanty. About 45 genera and probably 1000 species, of wide distribution.

Capsule dehiscent, several-seeded. 1. *Ipomoea.*
Fruit woody, indehiscent, mostly 1-seeded. 2. *Turbina.*

1. **IPOMOÈA** L.

Twining trailing or rarely erect herbs with large showy axillary flowers. Corolla funnelform or campanulate, the limb entire, 5-angled or 5-lobed, the tube plaited. Stamens included. Ovary entire, 2–4-celled, 4–6-ovuled; style filiform, included; stigmas 1 or 2, capitate or globose. Capsule usually septifragally 2–4-valved, 2–4-seeded. [Greek, worm-like.] About 400 species, of wide distribution. Type species: *Ipomoea Pes-tigrinis* L.

Sepals linear or lanceolate, long; ovary mostly 3-celled.
Bases of the sepals with long spreading hairs. 1. *I. Nil.*
Sepals glabrous, or sparingly short-pubescent.
Leaves silky-pubescent. 2. *I. villosa.*
Leaves glabrous or nearly so. 3. *I. cathartica.*
Sepals oblong to ovate, short; ovary mostly 2-celled or 4-celled.
Stems creeping; leaves obtuse or emarginate, entire, fleshy. 4. *I. Pes-caprae.*
Stems climbing or twining.
Flowers purple.
Sepals obtuse; leaves sagittate. 5. *I. sagittata.*
Sepals acute, cuspidate; leaves variously lobed or entire. 6. *I. Batatas.*
Flowers white with a purple throat; leaves digitately divided, the segments toothed. 7. *I. dissecta.*

1. Ipomoea Nil (L.) Roth. BLUE MORNING-GLORY. (Fig. 316.) Stems loosely pilose-pubescent, 2°–6° long, prostrate or twining. Leaves more or less pilose, the blades 1½′–5′ broad, cordate at the base, 3-lobed, the lobes acute or acuminate; peduncles short or elongated, 1–3-flowered; sepals narrowly linear, 8″–12″ long, their bases somewhat broadened and densely long-pubescent; corolla blue, fading purple, its tube 1′–1½′ long, the limb 2′–2½′ broad; ovary and capsule 3-celled; capsule about 4″ long. [*Convolvulus Nil* L.; *Pharbitis Nil* Choisy; *I. hederacea* of Verrill, as to the name.]

Occasional in waste and cultivated grounds. Introduced. Native of tropical regions. Flowers in summer and autumn. Not, as stated by Verrill, the most abundant species, at least at present.





2. Ipomoea villòsa R. & P. VILLOUS MORNING-GLORY. (Fig. 317.) Pubescent, twining, sometimes ascending trees to a height of 40° or more. Leaves thin, slender-petioled, the blades 3′–6′ long, pubescent on both sides, entire or 3-lobed, long-acuminate at the apex, deeply cordate at the base; peduncles 1–4-flowered, axillary, as long as the petioles or shorter; bracts linear-lanceolate, 8″–12″ long; sepals lanceolate, acuminate, pubescent, about 1′ long; corolla purple, about 3′ long. [*Ipomoea tamaicensis* of Rein, Lefroy, Hemsley and Moore; *Ipomoea purpurea* of Lefroy, Harshberger, Verrill and H. B. Small; *Pharbitis dealbata* and *P. trilaba* of Millspaugh.]

Common in marshes and in waste grounds. Introduced. Native of South America. Flowers in summer and autumn.



3. Ipomoea cathártica Poir. PURPLE MORNING-GLORY. (Fig. 318.) Perennial, minutely strigillose or glabrate. Stems more or less twining, branching; leaves broadly ovate, 2′–4′ long, entire or 3-lobed, acuminate, cordate; peduncles shorter than the subtending petioles; sepals glabrate, linear-lanceolate or ovate-lanceolate, 5″–10″ long, acuminate; corolla pink-purple or crimson, the limb 2½′–3½′ broad, undulate; capsules spheroidal, about 5″ broad. [*Convolvulus acuminatus* Vahl.; *Ipomoea acuminata* R. & S., not R. & P.; *Pharbitis cathartica* Choisy; *Pharbitis purpurea* of Millspaugh.]

Thickets, woodlands and roadsides. Native. Florida and the West Indies. Flowers from spring to autumn.



4. Ipomoea Pès-cáprae (L.) Roth. SEASIDE MORNING-GLORY. SEASIDE CONVOLVULUS. (Fig. 319.) Perennial, glabrous, succulent. Stems prostrate, creeping, sometimes 60° long or more, branching; leaf-blades suborbicular, 2½′–4′ broad, usually notched at the apex, rounded or cordate at the base; petioles as long as the blades or shorter; peduncles stout, 1–several-flowered; pedicels more slender than the peduncles; sepals glabrous, oval or suborbicular, about 5″ long, obtuse; corolla purple, about 2′ long, its tube broadly funnelform, its limb undulately-lobed, 2′–3′ broad; capsules broadly ovoid or globose-ovoid, 7″–9″ high; seeds pubescent.

Common on sea beaches. Native. Coasts of the southeastern United States, the West Indies, and tropical continental America. Flowers in summer and autumn. Its seeds probably reached Bermuda by floating. This vine is one of the most characteristic plants of the littoral of warm and tropical America.

5. Ipomoea sagittàta Lam. ARROW-LEAVED MORNING-GLORY. (Fig. 320.) Perennial, glabrous. Stems twining, 6°–15° long, branching, relatively slender. Leaves 1½′–4′ long, sagittate or hastate-sagittate, the segments linear or lanceolate, the lateral about ½ as long as the terminal one; petioles about as long as the basal lobes; peduncles usually 1-flowered; sepals glabrous, oblong to suborbicular, 3″–4″ long, obtuse or cuspidate; corolla purple, about 2′ long, the tube funnelform, the limb 2′–3′ broad; capsules ovoid, 5″–7″ long; seeds villous. [*Convolvulus sagittifolius* Michx.; *Ipomoea sagittifolia* Ker.]



Occasional in fresh-water marshes; abundant in Warwick Marsh. Native. Southern United States and Bahamas. Flowers from spring to autumn. Its seeds probably reached Bermuda on the wind.



6. Ipomoea Batàtas (L.) Lam. SWEET POTATO. (Fig. 321.) Rootstocks large, fleshy, the well-known vegetable. Stems glabrous or nearly so, trailing, 3° long or longer; leaf-blades various, ovate to suborbicular, entire, dentate or lobed, acuminate to obtuse, cordate at the base, 2′–6′ long; peduncles as long as the petioles or shorter, few-flowered; sepals oblong, acute, cuspidate, somewhat unequal, 3½″–5″ long; corolla pale purple or nearly white, about 2′ long; ovary and capsule 2-celled; seeds smooth. [*Convolvulus Batatas* L.; *Convolvulus edulis* Thunb.; *Batatas edulis* Choisy.]

Waste places, and persistent after cultivation. Introduced. Native habitat unknown.

The sweet-potato is cultivated, in a large number of different races, in all warm temperate and tropical regions, and is one of the important crops of Bermuda.



7. Ipomoea dissécta (Jacq.) Pursh. NOYAU VINE. (Fig. 322.) Perennial, villous-hirsute, or glabrate. Stems twining, branching; leaves suborbicular, 1½′–4′ in diameter, 5–7-parted, the segments oval to oblong or lanceolate, coarsely toothed or pinnatifid; petioles as long as the blades or longer, villous-hirsute; sepals glabrate, oblong to oblong-oval, 1′ long, acutish or obtuse; corolla white with purple throat, its tube funnelform, about 1′ long, its limb 1½′–2′ broad; capsules about 8″ long; seeds smooth and glabrous. [*Convolvulus dissectus* Jacq.; *I. sinuata* Ortega; *Operculina dissecta* House.]

Occasional in waste grounds and along roads, climbing on walls, rocks or trees. Introduced. Native of the southern United States and West Indies. Flowers in summer and autumn. Occasionally planted.

Ipomoea Horsfálliae W. Hook., MRS. HORSFALL'S MORNING-GLORY, West Indian, a long glabrous vine, the large leaves deeply 5-divided, or 5 segments with acuminate tips, the numerous, slender-pedicelled rose or light purple flowers 1½′–2′ broad, is occasionally planted for ornament.

Ipomoea Leàrii Paxton, LEAR'S MORNING-GLORY, probably South American in origin, but found also in the Old World tropics, a rapidly growing pilose vine up to 40° long, with large cordate entire or 3-lobed leaves, and many lilac or purple flowers 4′–5′ broad, is recorded by Lefroy as naturalized in gardens, and mentioned by Verrill.

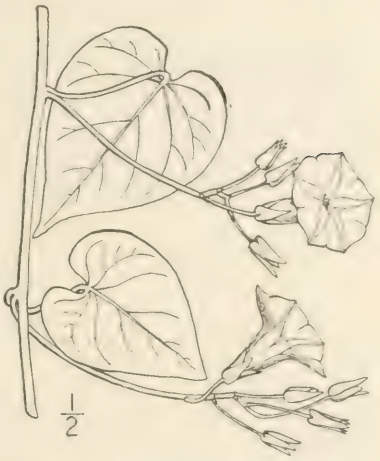
Ipomoea trîloba L., is erroneously attributed to Bermuda by Verrill, based on the record by Millspaugh of *Pharbitis triloba*, a different plant.

Calonyction aculeàtum (L.) House, MOON-VINE, of tropical America, a high-climbing vine, with smooth or sometimes muricate stems, ovate or suborbicular, entire lobed or toothed, cordate leaves often 6′ long, axillary 1–few-flowered peduncles which become thickened in fruit, the short sepals with tail-like appendages, the white corolla, opening at night, salverform, its tube 3½′–5′ long, its limb 2½′–4′ wide, is planted for ornament and rarely seen on roadsides. [*Convolvulus aculeatus* L.; *Ipomoea Bona-nox* L.; *Convolvulus grandiflorus* Roxb., not Lam.]

2. TURBÌNA Raf.

Vines with cordate leaves, and axiliary peduncled clusters of large or middle-sized flowers. Sepals ovate to lanceolate. Corolla campanulate or funnelform. Ovary 2-celled or 4-celled; stigmas 2. Fruit dry, woody, indehiscent, subglobose or ovoid, 1-celled, mostly 1-seeded, the seeds smooth. [Latin, from the supposed top-shaped fruit.] About 20 species, natives of tropical regions, the following typical.

1. Turbina corymbòsa (L.) Raf. WHITE CORYMBOSE MORNING-GLORY. (Fig. 323.) High-climbing or trailing, glabrous Leaves slender-petioled, ovate, entire, 1½′–4′ long, acute or acuminate at the apex, cordate at the base; peduncles axillary, as long as the leaves or longer, corymbosely or paniculately several–many-flowered, the pedicels slender; sepals oblong, persistent, the 3 inner ones 4″–6″ long, nearly twice as long as the two outer; corolla white, 1′–1½′ long; capsule ovoid, acute, about half as long as the longer sepals, 1-seeded. [*Convolvulus corymbosus* L.; *Ipomoea sidifolia* Choisy; *Rivea corymbosa* Hall. f.]



Occasional in marshes and thickets. Introduced. Native of tropical America. Flowers in winter and spring. Sometimes planted for ornament.

Quamoclit Quámoclit (L.) Britton, CYPRESS VINE, tropical American, commonly planted for ornament, is an annual climber with leaves pinnately parted into linear segments, and scarlet salverform corollas 1′–1½′ long, on peduncles often longer than the leaves. [*Ipomoea Quamoclit* L.; *Q. vulgaris* Choisy.]

Quamoclit coccínea (L.) Moench, SMALL RED MORNING-GLORY, also tropical American and planted for ornament, has similar flowers to those of the Cypress-vine, but its leaves are ovate, long-pointed, entire or angulate-lobed. [*Ipomoea coccinea* L.]

Jacquemontia jamaicénsis (Jacq.) Hallier, West Indian, recorded by Rein as found in Bermuda, and cited from him by Hemsley, who doubts its being indigenous, is a creeping vine with small white flowers and linear or oblong leaves. Subsequent botanists have not observed it, and the record is believed to be an error in determination, although Verrill describes the plant correctly and says it grows near the sea. [*Convolvulus jamaicensis* Jacq.]

Argyreia speciòsa (L.) Sweet, ELEGANT ARGYREIA, East Indian, a vine with white-tomentose branches, orbicular, cordate, long-petioled leaves 6′–12′ broad, silky tomentose beneath, long-stalked cymes of purplish flowers, subtended by large ovate acuminate, thin bracts, the sepals white-silky, the corolla about 2′ long, silky except at the plaits, and much narrowed at the base, was grown luxuriantly in a greenhouse at the Agricultural Station in 1913. [*Convolvulus speciosus* L.; *A. bracteata* Choisy.]

Argyreia Roxbúrghii Arn., ROXBURGH'S ARGYREIA, also East Indian, is a similar long vine with smaller, shorter-petioled leaves, and rose-purple flowers subtended by small bracts in dense, peduncled clusters. It was also luxuriant at the Agricultural Station in 1913.

Operculina tuberòsa (L.) Meissn., YELLOW MORNING-GLORY, a climbing vine, with nearly orbicular leaves 4′–7′ broad, deeply digitately cleft into 7 oblong-lanceolate acuminate lobes, the axillary peduncles several-flowered, thickened in fruit, the ovate blunt sepals 1′ long or longer, the bright yellow corolla tubular-campanulate, 2–3′ long, the capsule 1′–1½′ long, has been planted for ornament; according to Lefroy it was grown at St. George's prior to 1877.

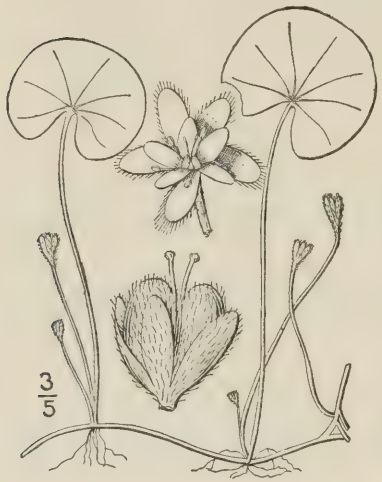
Family 2. **DICHONDRÀCEAE** Dumort.

DICHONDRA FAMILY.

Annual or perennial herbs, with creeping stems. Leaves alternate; their blades about as broad as long or broader, entire. Flowers solitary in the axils, commonly stalked. Calyx of 5 distinct or nearly distinct sepals. Corolla rotate or campanulate, 5-lobed, the lobes induplicate in the bud. Stamens 5, shorter than the corolla. Filaments filiform or subulate. Carpels 2, distinct, pubescent. Styles 2, distinct, basal. Stigmas capitate. Capsules 2 together, utricle-like, indehiscent. Seeds usually solitary or two, with a short testa. Only the following genus.

1. **DICHÓNDRA** Forst.

Characters of the family. [Greek, two-grained, referring to the capsules.]



About 5 species of warm and tropical regions. Type species: *Dichondra repens* Forst.

1. Dichondra carolinénsis Michx. CAROLINA DICHONDRA. (Fig. 324.) Perennial, softly pubescent. Stems creeping, 3′–15′ long, often branching; leaves reniform or suborbicular, 2″–10″ broad, rounded or retuse at the apex, entire, cordate; petioles much longer than the blades; pedicels shorter than the petioles; calyx silky, the sepals cuneate or cuneate-obovate, obtuse; corolla greenish white, 2″–3″ broad; capsules about 1″ high, utricle-like. [*D. repens* of Lefroy, Reade, Hemsley, Verrill, Kemp and Millspaugh.]

Common in shaded grassy places. Native. Southern United States, Central and South America. Flowers in spring and summer. Its seed probably reached Bermuda by a bird.

Family 3. **POLEMONIÀCEAE** DC.

PHLOX FAMILY.

Herbs, rarely vines. Flowers perfect, clustered, regular, or nearly so. Calyx inferior, tubular or campanulate, 5-cleft, the lobes or teeth slightly imbricated. Corolla gamopetalous, the limb 5-parted, the lobes contorted. Stamens 5, inserted on the tube of the corolla and alternate with its lobes; anthers versatile, 2-celled, the sacs longitudinally dehiscent. Ovary superior, mostly 3-celled; ovules 2–∞ in each cavity, amphitropous; style filiform; stigmas 3, linear. Capsule mostly loculicidally 3-valved. Seeds sometimes winged, sometimes enveloped in mucilage and emitting spiral tubes when wetted; endosperm present; embryo straight; cotyledons flat; radicle inferior. About 20 genera and more than 200 species, most abundant in western America. There are no native nor naturalized species in Bermuda.

Cobaea scándens Cav., COBAEA, South American, was grown at Mount Langton prior to 1877, and flowered luxuriantly but failed to produce seed. It is a very interesting glabrous vine, up to 20° long, with pinnate leaves of 2

or 3 pairs of stalked oval leaflets and a terminal forked tendril, the solitary, long-peduncled flowers about 1½′ broad, the corolla violet or purple.

Phlox Drummóndii Hook., Annual Garden Phlox, Texan, a glandular-pubescent annual, about 1° high, with sessile, ovate to lanceolate, entire alternate leaves 1′–2′ long, the flowers in terminal cymes, the calyx with 5 narrow lobes, the salverform corolla white, red or purple, its slender tube nearly 1′ long, its 5 obovate lobes spreading, is grown in flower-gardens.

Phlox paniculàta L., Perennial Garden Phlox, North American, a nearly glabrous erect perennial with oblong-lanceolate, petioled leaves 2′–4′ long, the white to purple flowers panicled, was grown in the Public Garden, St. George's, in 1913.

Family 4. **HYDROPHYLLÀCEAE** Lindl.

Water-leaf Family.

Herbs, mostly hirsute, pubescent or scabrous, with alternate or basal, rarely opposite leaves, and perfect regular 5-parted flowers, in scorpioid cymes, spikes or racemes, or rarely solitary. Calyx inferior, deeply cleft or divided. Corolla gamopetalous. Stamens 5, inserted on the corolla, and alternate with its lobes; filaments filiform; anthers mostly versatile, 2-celled, the sacs longitudinally dehiscent. Disk annular, or none. Ovary superior, 2-celled, or 1-celled with 2 placentae; styles 2, separate, or partly united; stigmas small, terminal; ovules anatropous or amphitropous. Capsule 1–2-celled, mostly loculicidally 2-valved. Seeds usually pitted, rugose or reticulated; endosperm fleshy or cartilaginous; embryo small; cotyledons half-terete or plano-convex. About 17 genera and 175 species, mostly natives of western North America.

1. **MARILAUNÌDIUM** Kuntze.

Branching pubescent herbs, with alternate entire leaves, the flowers solitary in the axils. Calyx 5-cleft. Corolla funnelform or salverform, 5-lobed, the lobes imbricated in the bud. Stamens mostly included, borne on the corolla-tube. Ovary 1-celled, or incompletely 2-celled; ovules numerous. Fruit a 2-valved capsule. [In honor of Dr. Anton Kerner Ritter von Marilaun.] About 20 species, natives of America, the following typical.



1. Marilaunidium jamaicénse (L.) Kuntze. Jamaica Weed. (Fig. 325.) Annual, much branched, the branches prostrate, 3′–15′ long. Leaves thin, spatulate or obovate, ½′–2′ long, obtuse or apiculate, narrowed to a sessile, somewhat decurrent base; peduncles 3″ long or less; calyx-segments hirsute, linear, 3″–4″ long; corolla white or purplish, about as long as the calyx, its lobes broad; capsule oblong, a little longer than the calyx. [*Nama jamaicensis* L.]

Waste and cultivated grounds, frequent. Native Southern United States, West Indies and tropical continental America. Flowers in spring. Its seeds were probably brought to Bermuda by a bird.

Nemophila insígnis Dougl., Blue Nemophila, Californian, grown in flower-gardens, is a low, pubescent annual, 6′–1° high, branched from the base. with pinnately parted flaccid leaves and blue flowers about ¾′ broad, the seeds tubercled.

Nemophila maculàta Benth., White Nemophila, also Californian, recorded by Jones, is similar to the preceding but with white corolla, about the same size, blotched and violet at the tips of the lobes, its seeds smooth or nearly so.

Family 5. **BORAGINÀCEAE** Lindl.

Borage Family.

Herbs or shrubs. Leaves alternate, rarely opposite or verticillate, estipulate, mostly entire and hispid or setose. Flowers perfect, usually regular, mostly blue, in one-sided scorpioid spikes, racemes, cymes, or sometimes scattered. Calyx inferior, mostly 5-lobed, 5-cleft, or 5-parted, usually persistent. Corolla gamopetalous, mostly regular and 5-lobed, rarely irregular. Stamens as many as the corolla-lobes and alternate with them, inserted on the tube or throat; anthers 2-celled, the sacs longitudinally dehiscent. Disk commonly inconspicuous. Ovary superior, of 2 2-ovuled carpels, entire, or the carpels commonly deeply 2-lobed, making it appear as of 4 1-ovuled carpels; style simple, entire or 2-cleft; ovules anatropous or amphitropous. Fruit mostly of 4 1-seeded nutlets, or of 2 2-seeded carpels. Endosperm fleshy, copious, or none; cotyledons mostly flat or plano-convex; radicle short. About 85 genera and 1500 species, of wide distribution, most abundant in the temperate zones, but many species tropical.

Fruit dry, separating into nutlets; herbs. 1. *Heliotropium.*
Fruit fleshy, drupaceous; silky maritime shrub. 2. *Mallotonia.*

1. **HELIOTRÒPIUM** [Tourn.] L.

Herbs or shrubs, with alternate mostly entire leaves, and small blue or white flowers, in scorpioid spikes, or scattered. Calyx-lobes or -segments lanceolate or linear. Corolla salverform or funnelform, naked in the throat, its tube cylindric, its lobes imbricated, plicate or induplicate in the bud. Stamens included; filaments short, or none. Stigma conic or annular. Fruit 2–4-lobed, separating into 4 1-seeded nutlets, or into 2 2-seeded carpels. [Greek, sun-turning, *i. e.*, turning to or with the sun.] About 125 species, widely distributed, most abundant in warm-temperate and tropical regions. Type species: *Heliotropium europaeum* L.

1. Heliotropium curassávicum L. SEA-SIDE HELIOTROPE. (Fig. 326.) Annual, fleshy, more or less glaucous, diffuse, the branches 4′–18′ long. Leaves linear, or linear-oblong, entire, inconspicuously veined, ¾′–2′ long, 1½″–3″ wide, obtuse; narrowed into petioles, or the upper sessile; scorpioid spikes dense, bractless, mostly in pairs; flowers about 2″ broad; calyx-segments acute; corolla white with a yellow eye or changing to blue; stigma umbrella-shaped; anthers acuminate; fruit globose.



Sandy seashores and salt marshes, frequent. Native. Florida and West Indies. The plant probably reached Bermuda by floating. Flowers from spring to autumn.

Heliotropium peruviànum L., GARDEN HELIOTROPE, CHERRY PIE, South American, commonly grown in flower-gardens, is a perennial pubescent herb, slightly woody, 2½° high or less, with oblong-lanceolate acute pinnately-veined leaves 1′–3′ long, the small, vanilla-scented flowers usually blue, numerous in terminal clusters.

2. MALLOTÒNIA [Griseb.] Britton.

Silvery-silky shrubs of the seacoast, with alternate leaves and small white flowers in dense 1-sided cymes, the fruits almost capitate. Calyx mostly 5-parted; corolla salverform, the 5-lobed limb shorter than the nearly cylindric tube, the lobes broad, valvate. Stamens short, included. Style simple. Drupe dry and bony, ovoid-conic, hollowed at the base, 2-pyrenous, the dissepiments solid. [Latin, related to *Mallotus*.] One species, or perhaps 2, of tropical and subtropical distribution, the following very characteristic and conspicuous plant of tropical American seacoasts typical.



1. Mallotonia gnaphalòdes (L.) Britton. Sea Lavender. (Fig. 327.) A somewhat fleshy shrub, 2°–4° tall, with silky-tomentose foliage, much branched and often forming large clumps, the twigs densely leafy. Leaves numerous, linear-spatulate, 1½′–4′ long, obtuse; cymes with 2–4 recurved branches; calyx campanulate, its lobes about 1″ long, oblong; corolla surpassing the calyx; fruit ovoid, 2½″–3″ high, black, with 2 nutlets. [*Heliotropium gnaphalodes* L.; *Tournefortia gnaphalodes* R. & S.]

Frequent on sea-beaches and coastal rocks. Native. Florida and the West Indies. The plant doubtless reached Bermuda by floating. Flowers from spring to autumn.

Tournefortia laurifòlia Vent., Laurel-leaved Tournefortia, of Porto Rico, a glabrous vine, with firm ovate evergreen leaves, and long, 1-sided spikes of small greenish flowers, is recorded by Lefroy as grown at Mt. Langdon.

Borago officinàlis L., Borage, European, a rough-hispid herb with oblong to obovate leaves 2′–5′ long, and showy blue flowers in terminal, leafy racemes, is grown in gardens.

Lithospermum distichum Ortega, Mexican, included by Lefroy in the Bermuda Flora as a native sea-side plant, is evidently an error either in record or determination. Lefroy's record is cited by H. B. Small, and copied by Verrill.

Myosotis palùstris (L.) Lam., Forget-me-not, European and Asiatic, occasional in flower-gardens, is a low perennial herb with decumbent branches, oblong or oblanceolate, obtuse appressed-pubescent leaves 1′–3½′ long, and slender racemes of small flowers, the corolla salverform, blue with a yellow eye, 5-lobed, about 3″ broad, the fruit 4 erect nutlets.

Family 6. **EHRETIÀCEAE** Schrad.

Ehretia Family.

Shrubs or trees, or some species herbs, with watery sap. Leaves mainly alternate, without stipules, simple. Flowers perfect, regular, in cymes. Calyx 5-lobed, persistent. Corolla gamopetalous, deciduous, its lobes spreading. Stamens 5, or 4 or 6, adnate to the base of the corolla-tube; filaments often united at the base; anthers introrse. Ovary 2–4-celled or 1-celled, some of the partitions being imperfect; styles 2, and distinct or partially united, or 4 and united by pairs. Ovules 1 or 2 in each cavity of the ovary. Fruit drupaceous, with a 4-celled but only 1-seeded stone or 2 two-seeded or 4 one-seeded stones. About 20 genera and 360 species, mostly of tropical distribution.

Sebesten Sebéstena (L.) Britton, Scarlet Cordia, Geiger Tree, Floridian and West Indian, an evergreen small tree, with rough ovate entire or slightly toothed leaves 3′–6′ long, clustered orange or flame-colored flowers about 1½′ long, the corolla with a funnelform tube and spreading lobes, the fruit a white drupe nearly an inch long, is much planted for ornament. [*Cordia Sebestena* L.]

Family 7. **VERBENÀCEAE** J. St. Hil.

Vervain Family.

Herbs, shrubs or some tropical genera trees, with opposite verticillate or rarely alternate leaves, and perfect irregular, or sometimes regular flowers, in spikes, racemes, cymes or panicles. Calyx inferior, mostly persistent, usually 4–5-lobed or 4–5-cleft. Corolla regular, or 2-lipped, the tube usually cylindric and the limb 4–5-cleft. Stamens 4, didynamous, rarely only 2, or as many as the corolla-lobes, inserted on the corolla and alternate with its lobes; anthers 2-celled, the sacs longitudinally dehiscent. Ovary superior, 2–4-celled (rarely 8–10-celled), composed of 2 carpels, each carpel with 2 anatropous or amphitropous ovules, thus in 4-celled ovaries 1 ovule in each cavity; style terminal; stigmas 1 or 2. Fruit dry, separating at maturity into 2–4 nutlets, or a drupe containing the 2–4 nutlets. Endosperm little or none, or rarely fleshy; embryo straight. About 75 genera and 1300 species, of wide geographic distribution.

A. Ovules 1 in each cavity of the ovary.
  Inflorescence centripetal.
    Flowers in spikes, heads or spike-like racemes; herbs or shrubs.
      Fruit of 2 or 4 dry nutlets.
        Stamens 4.
          Fruit of 4 nutlets. 1. *Verbena.*
          Fruit of 2 nutlets.
            Calyx not inflated. 2. *Lippia.*
            Calyx inflated. 3. *Priva.*
        Stamens 2; nutlets sunken in the axis of slender spikes. 4. *Valerianodes.*
      Fruit fleshy, drupaceous. 5. *Lantana.*
    Flowers in long racemes; shrubs or trees.
      Drupe subtended by the calyx; stigma 2-lobed. 6. *Citharexylum.*
      Drupe enclosed by the calyx; stigma 4-lobed. 7. *Duranta.*
  Inflorescence centrifugal, cymose or cymose-paniculate.
    Corolla irregular, its limb oblique; stamens long-exserted.
      Spiny shrub. 8. *Volkameria.*
      Unarmed shrubs or herbs. 9. *Clerodendron.*
    Corolla regular, small. 10. *Callicarpa.*
B. Ovules 2 in each ovary-cavity; swamp trees. 11. *Avicennia.*

1. **VERBÈNA** L.

Herbs (some exotic species shrubby), mostly with opposite leaves, and bracted flowers, in terminal spikes. Calyx usually tubular, 5-angled, unequally 5-toothed. Corolla salverform or funnelform, the limb spreading. Connective of the anthers unappendaged, or sometimes provided with a gland. Ovary 4-celled; ovule 1 in each cavity; style usually short, 2-lobed at the summit, one of the lobes stigmatic. Fruit mostly enclosed by the calyx, at length separating into 4 1-seeded linear or linear-oblong crustaceous nutlets. [Latin name of a sacred herb.] About 100 species, natives of America or a single one indigenous in the Mediterranean region. Type species: *Verbena officinalis* L.

Spikes slender, the fruits not overlapping.
Leaves pinnately cleft or incised. 1. *V. officinalis.*
Leaves merely toothed. 2. *V. scabra.*
Spikes stout, the fruits overlapping.
Bract shorter than the calyx; spikes elongated. 3. *V. bonariensis.*
Bract as long as the calyx or longer; spikes short. 4. *V. rigida.*



1. Verbena officinàlis L. European Vervain. Herb-of-the-Cross. Berbine. (Fig. 328.) Stem 4-sided, glabrous or nearly so, diffusely branched, 1°–3° high. Leaves minutely pubescent, the lower deeply incised or 1–2-pinnatifid, ovate, oblong, or obovate, 1′–3½′ long, narrowed into margined petioles, the teeth acute; upper leaves linear or lanceolate, acute, entire, sessile; spikes filiform, at length 4′–5′ long; fruits less than 1″ high, scattered; bracts ovate, acuminate; corolla purplish or white, the limb about 1½″ broad. [*V. littoralis* of Moore.]

In waste places and cultivated ground. Naturalized. Native of Europe. Naturalized in the southern United States and in tropical America. Flowers from spring to autumn.

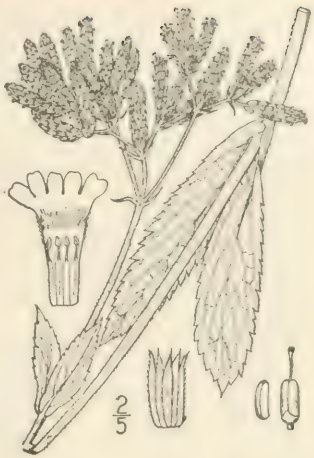
2. Verbena scàbra Vahl. Rough Vervain. (Fig. 329.) Annual, or perhaps of longer duration; stem rather slender, erect, simple or branched, 1°–4½° high, pubescent with spreading hairs. Leaves 1′–3′ long, ovate to lanceolate, papillose-scabrous above, pubescent on the veins beneath, regularly dentate nearly all around, acute or acuminate at the apex, slender-petioled; spikes very slender, spreading, often 6′ long, rather densely many-flowered; calyx about 1″ long, its lobes acute, converging over the fruit; corolla pinkish, about 2″ wide; nutlets nearly 1″ long. [*V. urticifolia* of Reade, Hemsley, H. B. Small and Moore.]

Common in marshes, and in waste and cultivated grounds. Naturalized. Native of the southern United States, Mexico and the West Indies. Flowers from spring to autumn.



3. Verbena bonariénsis L. South American Vervain. (Fig 330.) Annual, villous-hirsute above. Stems 2°–4° tall, branching above; leaves oblong to oblong-lanceolate, 1½′–4′ long, serrate with broad teeth or nearly entire below the middle, partly clasping; spikes dense, about 1′ long, and 2½″ thick, in rather compact cymes; calyx delicately pubescent, becoming 1½″–2″ long, its lobes acute; corolla pubescent without, its tube nearly twice as long as the calyx, the limb 1″ broad; nutlets about 1″ long, glabrous.

Frequent in waste places. Naturalized. Native of South America. Naturalized in the southeastern United States, and in the mountains of Jamaica. Flowers from spring to autumn.





4. Verbena rìgida Spreng. Stiff Verbena. (Fig. 331.) Perennial, pubescent, rather stiff, simple, or branched from the base, 1°–2° high. Leaves oblong, oblong-lanceolate, or the lowest obovate, sessile, 1′–4′ long, scabrous, sharply serrate with rather distant teeth, acute at the apex, rounded or subcordate at the base; spikes few, 1′–2′ long, densely-flowered; bracts lanceolate-subulate, mostly longer than the calyx, ciliate; calyx about 3″ long; corolla purple, its slender, pubescent tube about 5″ long, the limb about 3″ broad; nutlets 2½″ long. [*V. chamaedryfolia* of H. B. Small; *V. venosa* Gill. & Hook.]

Waste grounds, fields and lawns, occasional, probably escaped from gardens. Introduced. Native of South America. Flowers in summer and autumn.

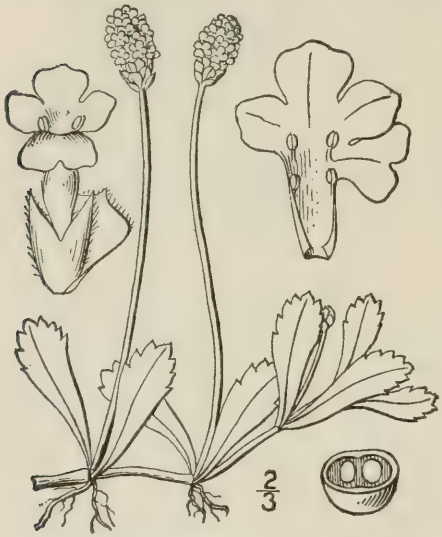
Verbena chamaedrifòlia Juss., Garden Verbena, South American, with oblong to ovate, short-petioled, unevenly serrate leaves 1′–2′ long, and scarlet to red or purple flowers in compact terminal clusters, the narrow hirsute calyx about ½′ long, the corolla-tube a little longer than the calyx, the corolla-limb about ½′ broad, is widely grown in flower-gardens. There are a great many hybrids of this with related species.

Verbena erinoides Lam., Moss Verbena, South American, has 3-parted leaves, their segments pinnatifid into narrow lobes, and terminal spikes of small violet or lilac flowers. It is recorded by Lefroy as grown in Bermuda prior to 1877. [*V. multifida* R. & P.]

2. LÍPPIA Houst.; L.

Perennial herbs, or shrubs, with opposite, or rarely alternate leaves, and small bracted flowers, in spikes or heads. Calyx small, ovoid, campanulate or

compressed and 2-winged, 2–4-toothed or 2–4-cleft. Corolla-tube cylindric, the limb oblique, somewhat 2-lipped, 4-cleft. Stamens 4, didynamous; anthers ovate, not appendaged, the sacs nearly parallel. Ovary 2-celled; ovules 1 in each cavity; style short; stigma oblique or recurved. Fruit dry, with a membranous exocarp, at length separating into 4 nutlets. [Named in honor of Auguste Lippi, 1678–1703, a French naturalist.] About 100 species, most abundant in tropical America. Type species: *Lippia americana* L.



1. Lippia nodiflòra (L.) Michx. CAPE-WEED. GODET'S-WEED. (Fig. 332.) Minutely and rather densely puberulent, creeping, or the branches ascending, 1°–3° long. Leaves thickish, spatulate, oblanceolate, or obovate, ½″–2½″ long, 3″–10″ wide, mostly obtuse, narrowed into a cuneate entire base, sharply serrate above the middle; heads at length cylindric and ½′–1′ long; corolla purple to white. [*Verbena nodiflora* L.; *Lippia reptans* of Jones and Lefroy.]

Common on hillsides and in dry soil generally, one of the most abundant native plants. Southern United States, West Indies, tropical continental America and Old World tropics. Its seeds probably brought to Bermuda by a bird or on the wind. Flowers from spring to autumn.

Lippia micromèra Schauer, West Indian, a low shrub with very small obovate toothed leaves, very fragrant when crushed, and small whitish flowers in terminal heads, is grown in gardens. The plant is recorded as native by Lefroy, but this appears to be erroneous, and no other author mentions it as Bermudian.

Lippia triphýlla (L'Her.) Kuntze, LEMON VERBENA, South American, commonly grown in gardens for its fragrant foliage, is a low slender shrub with narrowly lanceolate toothed leaves 1′–3′ long, and very small, whitish flowers in terminal clustered spikes. [*L. citriodora* HBK.; *Aloysia citriodora* Pers.; *Verbena triphylla* L'Her.]

3. PRÌVA Adans.

Perennial caulescent herbs, the leaves opposite, membranous, toothed, the flowers in slender peduncled spikes. Calyx-tube 5-ribbed; lobes 5. Corolla salverform, its tube straight or incurved, slightly dilated above, its limb spreading, oblique, slightly 2-lipped, with 5 short lobes. Stamens 4, didynamous, included; anthers with parallel or slightly divergent sacs. Ovary 2-celled, each cavity with more or less well developed septa. Ovules 2, or by abortion 1, at the base of each cavity. Fruit enclosed in the calyx, separating into 2 nutlets. [Name unexplained.] About 10 species of tropical distribution, the following typical.

1. Priva lappulàcea (L.) Pers. BURVERVAIN. (Fig. 333.) More or less pubescent. Stems 8′–2° tall, branching; leaves ovate, ½′–4′ long, acute or acuminate, serrate, truncate or cordate at the base, the petioles much shorter than the blades; racemes loosely flowered, 2′–6′ long; pedicels ½″–1″ long; calyx cylindric-prismatic, about 1½″ long, accrescent, pubescent; corolla slightly surpassing the calyx, salverform, with short rounded lobes; fruit ovoid-pyramidal, 2½″–3½″ long; nutlets included in the calyx, spiny-tuberculate on the back, 1½″–2″ long. [*Verbena lappulacea* L.; *Priva echinata* Juss.]



Collected in Bermuda by Munro, according to Hemsley, but no specimen is preserved at Kew or at the British Museum; as it is a common weed of warm and tropical regions it may very likely have been found in Bermuda, perhaps only as a waif. We have failed to find it.

4. **VALERIANÒDES** [Boerh.] Medic.

Annual or perennial herbs, or shrubs, the leaves opposite or alternate, toothed. Flowers spicate, solitary and sessile in the axils of bracts, or imbedded in excavations of the thick rachis. Calyx membranous or herbaceous, its lobes 5, usually unchanged at maturity. Corolla-tube sometimes slightly dilated above, the limb spreading; lobes 5. Stamens 2, included; anthers with unappendaged connectives; staminodia 2, small. Ovary 2-celled. Ovules solitary in each cavity. Fruit included in the calyx, separating into 2 nutlets. [Signifies similarity to Valerian, but this is obscure.] More than 40 species, of tropical and subtropical America, the following typical.



1. Valerianodes jamaicénsis (L.) Kuntze. JAMAICA VERVAIN. (Fig. 334.) An annual shrubby plant, 1°–3½° high, often purplish, with sparingly pubescent or glabrate foliage. Leaves alternate or opposite, oblong, ovate or oval, 1′–3½′ long, coarsely serrate, narrowed at the base, the petioles margined, as long as the blades or shorter; spikes 6′–2° long, quill-like; bracts imbricated, lanceolate to oblong-lanceolate, acuminate, serrulate, 3″–4″ long; flowers borne in depressions of rachis; calyx-lobes triangular or triangular-ovate; corolla blue, somewhat irregular, 4″–6″ long, its tube slightly curved, the limb 3″–4″ broad; nutlets 1½″ long, buried in the rachis. [*Verbena jamaicensis* L.; *Stachytarpheta jamaicensis* Vahl.]

Common in fields and in waste places. Native, Florida, the West Indies and tropical continental America. Flowers from spring to autumn. Its seeds were probably transported to Bermuda by a bird, or on the wind.

5. LANTÀNA L.

Shrubs, or rarely herbs, with pubescent foliage, sometimes armed with prickles. Leaves opposite, toothed, often rugose. Flowers in dense peduncled heads or spikes. Calyx membranous, with a truncate or sinuate border. Corolla-tube slender, often curved, sometimes slightly dilated above; the limb more or less 2-lipped, the lobes 4 or 5, obtuse or retuse. Stamens 4, didynamous; filaments adnate to about the middle of the corolla-tube. Ovary 2-celled, stigma oblique; ovules solitary in each cavity. Fruit small, drupe-like. Nutlets 2-celled or separating into 2 one-seeded nutlets. [Named from fancied similarity to *Viburnum Lantana.*] About 60 species, natives of tropical and warm regions. Type species: *Lantana Camara* L.

Flower-heads not involucrate; leaves large.
- Flowers yellow to orange; stems unarmed or a little prickly. 1. *L. Camara.*
- Flowers yellow to pink; stems strongly armed with hooked prickles. 2. *L. aculeata.*

Flower-heads involucrate; leaves small; flowers lilac to white. 3. *L. involucrata.*



1. Lantana Camàra L. RED SAGE-BUSH. ENGLISH SAGE-BUSH. (Fig. 335.) A branching shrub 3°–5° tall, rigid-pubescent, unarmed, or slightly prickly. Leaves ovate to oblong-ovate, 1′–4′ long, obtuse, acute, or short-acuminate, finely crenate-serrate, rounded or narrowed at the base; bracts oblong to lanceolate, 2″–4″ long; calyx very thin, 1½″ long; corolla yellow or orange, the tube about 5″ long, puberulent, slightly curved, barely enlarged above the middle; limb 3″–4″ wide. [*L. crocea* of Reade, Lefroy, Kemp, H. B. Small, Harshberger, Verrill and Rein.]

Common on hillsides, in fields and waste grounds. Naturalized. Florida, the West Indies and tropical continental America. Flowers from spring to autumn. The species consists of many races; the one inhabiting Bermuda appears to be essentially unarmed.

2. Lantana aculeàta L. PRICKLY SAGE. PINK SAGE-BUSH. (Fig. 336.) A shrub, 4°–6° high, or sometimes with longer, half-climbing stems, the slender, sparingly pubescent, 4-sided branches armed with stout flattened hooked prickles 1″–2″ long. Leaves ovate to ovate-lanceolate, petioled, 2′–3′ long, crenate, reticulate-veined, acute or acuminate at the apex, narrowed to the base; peduncles 1½′–3′ long; heads several–many-flowered, not involucrate, the narrow bracts pubescent, 2″–3″ long; corolla about ½′ long, yellow to orange, turning pink, its limb 3″–4″ broad. [*L. polyacantha* of A. H. Moore.]

Abundant on hillsides along South Shore Road, Devonshire, 1912, first observed in that vicinity in 1905. Naturalized. Native of tropical America. Flowers in summer and autumn, perhaps also earlier. Sometimes grown in gardens.





3. Lantana involucràta L. COMMON SAGE-BUSH. (Fig. 337.) A puberulent, much branched shrub, 2°–5° high, the branches stiff, nearly terete. Leaves elliptic or oval, petioled, ½′–1½′ long, crenulate, obtuse at the apex, narrowed or obtuse at the base, scabrous above, pubescent beneath; peduncles ½′–2′ long, slender; heads several-flowered, involucrate by several ovate or ovate-lanceolate bracts 1½″–3″ long; corolla lilac or nearly white, its tube 3″–4″ long; drupes about 2″ in diameter. [*L. odorata* L.]

Common in all dry uncultivated situations, the most abundant shrub of Bermuda. Naturalized, according to Lefroy, who states definitely that it was introduced from the Bahamas prior to 1800, with the idea that it would be good for firing; but the bush does not make wood enough to be of use for that purpose, and it certainly appears as if native. Florida and the West Indies. Flowers nearly throughout the year.

Lantana Sellowiàna Link & Otto. WEEPING OR TRAILING LANTANA. South American, is a finely hairy shrub, 2½° high or less, with weak and slender branches, oval or ovate leaves 1′ long or less, roughish above, tomentulose beneath; the lilac flowers are in small terminal heads, the corolla-limb 4″–5″ broad, with a long lower lobe. It is occasionally planted in borders for ornament.

Lantana nivea Vent, WHITE LANTANA, South American, occasional in gardens, has prickly or nearly unarmed branches, ovate crenulate slender petioled leaves 2′–4′ long, the white capitate flowers turning rose or bluish, with a yellow eye. It forms a shrub up to 6° high.

6. CITHARÉXYLUM L.

Trees or shrubs, with alternate estipulate leaves and small flowers in terminal or axillary racemes, the pedicels subtended by minute bracts. Calyx narrowly campanulate, minutely 5-lobed, persistent. Corolla salverform, its limb slightly oblique, 5-lobed. Stamens 4 or 5, adnate to the corolla-tube, the fifth one mostly sterile or rudimentary; filaments filiform. Ovary sessile, incompletely 4-celled; ovules solitary, anatropous; stigma 2-lobed. Drupes berry-like, the fleshy pulp enclosing a bony stone which separates into 2 2-seeded nutlets. [Greek, fiddle-wood; French, bois fidèle.] About 20 species, of tropical America, the following typical.



1. Citharexylum spinòsum L. FIDDLE-WOOD. (Fig. 338.) A tree, reaching a maximum height of 50° or more with a trunk sometimes 3° in diameter, freely branching, the twigs 4-sided, glabrous. Leaves elliptic or oblong-elliptic, rather thin, deciduous in spring, 8′ long or less, 1½′–3′ wide, acute or acuminate at the apex, narrowed at the base, the petioles ½′–1′ long, the blades entire, or those of shoots coarsely serrate; racemes slender, many-flowered, 4′–8′ long, often branched near the base; pedicels only about ½″ long; calyx about 2″ long, puberulent; flowers very fragrant; corolla white, about 4″ long; stamens 4; drupe obovoid-oblong, black, shining, about 5″ long. [*C. quadrangulare* Jacq.]

Common on hillsides, especially in Hamilton Parish. Naturalized. Native of the Lesser Antilles. Flowers in summer and autumn. Recorded as introduced about 1830. A large tree at Paynter's Vale is pointed out as the plant first brought to Bermuda. Useful only for firewood and shade. A tree of rapid growth, the wood light in weight. The oldest specific name of this tree, *spinosum*, is unfortunate, as there are no spines on the plant.

7. DURÁNTA L.

Shrubs or small trees, with sometimes armed branches, the leaves opposite or whorled, entire or toothed. Flowers small, in elongated terminal or short axillary racemes. Calyx campanulate or tubular, truncate or minutely 5-lobed. Corolla funnelform or salverform, its tube cylindric, straight or incurved, its limb spreading, oblique or of 5 equal lobes. Stamens 4, didynamous, included; anthers with unappendaged connectives, the sacs distinct. Ovary partially or imperfectly 8-celled. Stigma oblique, sometimes unequally 4-lobed. Ovules solitary or 2 in each cavity. Drupe included in the calyx, of 4 nutlets. Seeds without endosperm. [In honor of Castor Durante, a physician of Rome.] About 8 species, natives of tropical America, the following typical.

1. Duranta rèpens L. PIGEONBERRY. (Fig. 339.) A shrub or small tree reaching a height of 18°, with glabrate or finely pubescent foliage and unarmed or spiny, slender, often drooping or trailing branches. Leaves numerous, ovate-elliptic, oval or obovate, ½′–2′ long, obtuse or apiculate, entire or serrate above the middle, short-petioled; racemes 2′–6′ long, recurving, paniculate; pedicels ½″–2½″ long; calyx angled, its lobes acute, shorter than the tube; corolla lilac, the tube surpassing the calyx, the limb 3½″–5″ broad; fruit yellow, globular, 3½″–5″ in diameter, enclosed by the accrescent yellowish calyx which is produced into a curved beak. [*D. erecta* L.; *D. Plumieri* Jacq.]



Frequent on hillsides. Naturalized. Native of Florida, the West Indies and tropical continental America. Flowers from spring to autumn. Sometimes planted for ornament

8. VOLKAMÈRIA L.

A vine-like, spiny shrub with opposite petioled entire leaves, and white flowers in axillary cymes. Calyx campanulate, 5-toothed. Corolla salverform, with a slender tube, the limb 5-lobed. Stamens 4, exserted, somewhat unequal. Style filiform. Stigma 2-lobed. Fruit a subglobose drupe, the 2 nutlets each 2-celled. [In honor of J. C. Volkamer, a Nuremberg botanist, who died in 1720.] Only the following species, native of tropical America.



1. Volkameria aculeàta L. PRICKLY MYRTLE. (Fig. 340.) Climbing to a length of 10° or more, or nearly erect, the slender branches densely puberulent, armed with stout opposite spreading spines 4″ long or less. Leaves thin, slender-petioled, oblong to elliptic-obovate, obtuse or acute at the apex, narrowed to the base, 1′–2′ long; cymes stalked, few–several-flowered; pedicels slender, puberulent, 3″–7″ long, calyx about 1½″ long, puberulent, its teeth triangular-ovate, acute; tube of the corolla about 9″ long, its limb about 6″ broad; stamens purple; drupe 4-grooved, 3″–4″ in diameter. [*Clerodendron dentatum* Griseb.]

Occasional in thickets and along roads, escaped from cultivation. Naturalized. Native of the West Indies. Flowers in summer and autumn.

9. CLERODÉNDRON [Burm.] L.

Shrubs, vines or perennial herbs, with opposite entire leaves, and flowers in terminal or axillary cymes or panicles. Calyx 5-toothed or 5-lobed Corolla salverform or funnelform, the tube mostly longer than the 5-lobed limb. Stamens 4, borne on the corolla-tube, exserted, somewhat unequal. Stigma 2-lobed; ovary 4-celled. Fruit a drupe, enclosing 4 1-seeded nutlets. [Greek, tree of fortune.] Probably 100 or more species, mostly natives of tropical regions. Type species: *Clerodendrum infortunatum* L.



1. Clerodendron fràgrans Vent. ODOROUS CLERODENDRON. (Fig. 341.) Half-shrubby, finely pubescent, 2°–5° high, the stout branches angled. Leaves very broadly ovate, 4′–8′ long, acute at the apex, cordate or nearly truncate at the base, coarsely dentate, long-petioled; flowers white, fragrant, double in all American specimens examined, in dense terminal cymes, the corolla about 1′ broad; calyx 5-cleft, its lanceolate lobes acuminate; corolla-lobes rounded. [*C. capitatum* of Lefroy, Jones and H. B. Small.]

Occasional in waste grounds, locally abundant. Naturalized. Native of tropical Asia. Flowers in summer and autumn. Naturalized in Florida and the West Indies.

Clerodendron Thómpsonae Balfour, MRS. THOMPSON'S CLERODENDRON, African, a glabrous, high-climbing vine, with ovate petioled acute or acuminate, 3-nerved leaves 2′–4′ long, panicled flowers, the white inflated calyx angled, sharply 5-lobed, about 8″ long, the red corolla with a spreading limb 8″–10″ broad, is occasionally planted for ornament.

Clerodendron glàbrum E. Meyer, BUSH CLERODENDRON, of South Africa, occasionally planted for ornament, is a large glabrous shrub up to 9° high, with slender-petioled, ovate-elliptic, pointed thin leaves 2′–3′ long, and large terminal panicles of small fragrant pinkish flowers with exserted stamens, the bright white oblique berry-like fruit about 4″ long.

Clerodendron fállax Lindl., SCARLET CLERODENDRON, of Java, commonly grown in flower-gardens, is herbaceous, 2°–4° high, velvety-pubescent, the long-petioled, nearly orbicular, cordate leaves 3′–6′ broad, the terminal panicled scarlet flowers 1′–1½′ long, the slender corolla-tube longer than the corolla-limb, and about 4 times as long as the 5-cleft calyx.

10. CALLICÁRPA L.

Shrubs or trees, with opposite leaves, and small blue purple or white flowers in axillary cymes. Calyx short, campanulate, 4-toothed (rarely 5-toothed), or truncate. Corolla-tube short, expanded above, the limb 4-cleft (rarely 5-cleft), the lobes equal. Stamens 4, equal, exserted; anther-sacs parallel. Ovary incompletely 2-celled; ovules 2 in each cavity, laterally attached, amphitropous; style slender; stigma capitate, or 2-lobed. Fruit a berry-like drupe, much longer than the calyx, containing 1–4 nutlets. [Greek, handsome fruit.] About 35 species, the following of southeastern North America, the others Asiatic, African and of tropical America, the following typical.



1. Callicarpa americàna L. TURKEY-BERRY. FRENCH MULBERRY. (Fig. 342.) A shrub, 2°–5° high, the twigs, petioles and young leaves stellate-scurfy, the mature leaves glabrous or nearly so, and glandular-dotted. Twigs terete; leaves thin, ovate, slender-petioled, acute or acuminate, crenate-dentate, 2½′–6′ long; cymes many-flowered, short-peduncled; pedicels very short; calyx-teeth much shorter than the tube; corolla pale blue, about 2″ long; fruit violet-blue, globose, 1½″ in diameter. [*C. ferruginea* of Reade, Lefroy, Verrill, Hemsley and H. B. Small.]

Paget Marsh, 1913. Native. Recorded as formerly growing in woodlands between Harrington Sound and Castle Harbor, but not found in that region recently. Southeastern United States. Flowers in spring and summer. The large clusters of fruit are very showy.

11. AVICÉNNIA L.

Evergreen trees, sometimes shrubby, with nodose twigs, opposite entire leathery leaves without stipules, and peduncled clusters of white bracted flowers. Calyx cup-shaped, silky, with 5 persistent lobes. Corolla campanulate, its short tube nearly cylindric, its limb spreading, 4-lobed. Stamens 4, adnate to the corolla-tube, the anthers introrse. Ovary sessile, 1-celled; ovules 4, on a central placenta; style short, 2-lobed. Fruit capsular, oblique, apiculate. Seeds without endosperm, usually germinating in the capsule. [In honor of Avicenna (980–1036) of Bokhara, a distinguished oriental physician.] Three known species, of tropical and subtropical seacoasts. Type species: *Avicennia officinalis* L.



1. Avicennia nítida Jacq. BLACK MANGROVE. (Fig. 343.) A tree, in Bermuda up to about 45° high, with shallowly fissured dark scaly bark, orange-red within. Young twigs finely pubescent. Leaves pubescent when young, soon becoming glabrous above, oblong or oblong-lanceolate, 1¼′–3½′ long, obtuse or apiculate at the apex, finely canescent beneath, narrowed at the base into short petioles; panicles 1′–2′ long; corolla 5″–7″ broad, its lobes rounded; capsule oblong or elliptic, 1′–2′ long, light green, slightly pubescent.

Common along the borders of salt water lagoons and in saline swamps, which it sometimes completely fills. Native. Southern United States and West Indies. Flowers from spring to autumn. Its fruit doubtless reached Bermuda by floating. Its wood is heavy, hard, and dark brown, durable in contact with the ground.

Tectona grándis L., TEAK, East Indian, was represented in the collection at the Agricultural Station in 1913, by a vigorous young plant. It is a large tree with very valuable wood; its large, opposite leaves are oval, short-petioled, pointed, whitish canescent beneath with stellate hairs, shining above. The small whitish flowers are in large terminal panicles, the funnelform corolla with a 5-cleft limb, the fruit a 4-celled drupe, about ½′ thick, nearly globular.

Vitex Agnus-càstus L., CHASTE-TREE, of southern Europe and western Asia, a shrub up to 9° tall with palmately compound, opposite petioled leaves of 5 or 7 narrowly lanceolate, short-stalked acuminate leaflets 3′–4′ long, dark green above, whitish-puberulent beneath, the small white to blue flowers in terminal narrow interrupted racemes or panicles, the corolla 3″–4″ long, the stamens and style exserted, is grown for ornament.

Siphonanthus índica L., SIPHONANTHUS, East Indian, a glabrous herbaceous perennial, with virgate stems up to 12° high, verticillate lanceolate entire leaves 4′–8′ long, sessile or nearly so, the flowers in peduncled cymes, the calyx ½′–¾′ broad, deeply 5-lobed, the white or yellow corolla with a slender tube 3′–4′ long and a spreading 5-lobed limb about 1′ broad, the stamens and style exserted, is grown for its interest. [*Clerodendron Siphonanthus* R. Br.]

Petraea volùbilis Jacq., PURPLE WREATH, South American, occasionally planted for ornament, is a vine, 15° long or more, with opposite entire roughish short-petioled leaves, elliptic to obovate, 3′–4′ long; its flowers are borne in terminal racemes often 1° long, the slender pedicels about 1′ long, the 5 linear-oblong blunt veiny purple or lilac sepals spread widely and persist after the smaller, funnelform corolla has fallen.

Petraea arbòrea H.B.K., TREE PETRAEA, also South American, recorded by Jones as grown in Bermuda, is tree-like, with foliage similar to that of the Purple Wreath, but the blue flowers are in axillary racemes.

Family 8. **LAMIACEAE** Lindl.

MINT FAMILY.

Aromatic punctate herbs, or shrubs (a few tropical species trees), mostly with 4-sided stems and simple opposite leaves; stipules none. Flowers irregular, perfect, clustered, the inflorescence typically cymose, usually bracteolate. Calyx inferior, persistent, 5-toothed or 5-lobed (rarely 4-toothed), mostly nerved. Corolla with a short or long tube, the limb 4–5-lobed, mostly 2-lipped, regular in a few genera; upper lip 2-lobed, or sometimes entire; lower lip mostly 3-lobed. Stamens borne on the corolla-tube, typically 4 and didynamous, sometimes 2, rarely equal; filaments separate, alternate with the corolla-lobes; anthers 2-celled, introrse, or confluently 1-celled, or sometimes of a single sac. Disk usually present, fleshy. Ovary 4-lobed, or 4-parted, superior, each lobe or division with 1 mostly anatropous ovule; style arising from the centre of the lobed or parted ovary, 2-lobed at the summit. Fruit of 4 1-seeded nutlets. Seed erect (transverse in *Scutellaria*); endosperm scanty, or none; embryo mostly straight; radicle short, inferior. About 160 genera and 3200 species, of wide distribution. The family is also known as LABIATAE.

Stamens and style very short, included in the corolla-tube. 1. *Sideritis.*
Stamens and style longer, more or less exserted.
  Corolla strongly 2-lipped, the upper lip concave.
    Anther-bearing stamens 4.
      Calyx distinctly 2-lipped, closed in fruit. 2. *Prunella.*
      Calyx not 2-lipped, open in fruit.
        Nutlets 3-sided, truncate.
          Calyx-teeth not spiny-tipped. 3. *Lamium.*
          Calyx-teeth spiny-tipped.
            Calyx-teeth 5. 4. *Leonurus.*
            Calyx-teeth 8–10. 5. *Leonotis.*
        Nutlets ovoid, rounded above. 6. *Stachys.*
    Anther-bearing stamens 2.
      Inflorescence terminal. 7. *Salvia.*
      Inflorescence axillary. 8. *Rosmarinus.*
  Corolla regular, or 2-lipped with the upper lip flat or nearly so.
    Corolla 2-lipped. 9. *Clinopodium.*
    Corolla nearly regular or slightly 2-lipped, 4–5-lobed. 10. *Mentha.*

1. **SIDERITIS** [Tourn.] L.

Herbs or shrubs, with opposite leaves, and small flowers in axillary clusters. Calyx tubular, 5–10-nerved, slightly 2-lipped, its teeth spiny-tipped, the upper middle one broader than the others. Corolla longer than the calyx, 2-lipped, the upper lip entire or lobed, the lower longer than the upper, its middle lobe broad. Stamens 4, didynamous, included, the anterior pair the longer; anthers 2-celled. Ovary 4-lobed. Nutlets obovoid, smooth. [Greek, iron, referring to its use in medicine.] About 45 species, natives of the Old World. Type species: *Sideritis hirsuta* L.



1. Sideritis romàna L. IRON-WORT. (Fig. 344.) Annual, erect, 4′–1° high, pubescent with spreading hairs, usually branched. Leaves obovate to oblong, ½′–1½′ long, crenate, sessile or nearly so; clusters few-flowered; flowers white or pinkish; calyx-teeth shorter than the tube, the middle one of the upper lip ovate, all subulate-tipped; corolla a little exceeding the calyx, the middle lobe of the lower lip reniform.

Occasional in waste grounds. Naturalized. Native of Europe. Introduced into the United States. Flowers in spring.

2. PRUNÉLLA L.

Perennial herbs, with petioled leaves, and rather small clustered purple or white flowers, in dense bracted spikes or heads. Calyx oblong, reticulate-veined, about 10-nerved, deeply 2-lipped, closed in fruit; upper lip nearly truncate, or with 3 short teeth; lower lip 2-cleft. Corolla-tube inflated, slightly narrowed at the mouth, its limb strongly 2-lipped; upper lip entire, arched; lower lip spreading, 3-lobed. Filaments of the longer stamens 2-toothed at the summit, one of the teeth bearing the anther, the other sterile; anthers 2-celled, the sacs divergent or divaricate. Nutlets ovoid, smooth. [Origin of name doubtful; often spelled *Brunella,* the pre-Linnaean form.] About 5 species, natives of the North temperate zone, the following typical.

1. Prunella vulgàris L. SELF-HEAL. HEAL-ALL. (Fig. 345.) Stem slender, 2° high or less. Leaves ovate, oblong or oblong-lanceolate, rather thin, 1′–4′ long, the lowest commonly shorter and sometimes subcordate; spikes terminal, sessile or short-peduncled, becoming 2′–4′ long in fruit; bracts broadly ovate-orbicular, cuspidate, ciliate; corolla violet, purple or sometimes white, 4″–6″ long, about twice as long as the calyx.

Grassy woodlands, Devonshire and on St. David's Island. Introduced. Native of Europe. Widely naturalized in North America. Flowers from spring to autumn.



3. LÀMIUM [Tourn.] L.

Mostly diffuse herbs, with crenate dentate or incised, usually cordate leaves, and rather small flowers, verticillate in axillary and terminal clusters. Calyx tubular-campanulate, about 5-nerved, 5-toothed, the teeth equal or the upper ones longer. Corolla-limb 2-lipped; upper lip concave, erect, usually entire; lower lip spreading, 3-cleft, the middle lobe emarginate, contracted at the base. Anthers 2-celled, the sacs divaricate, often hirsute on the back. [Greek, throat, from the ringent corolla.] About 40 species, of the Old World. Type species: *Lamium purpureum* L.

1. Lamium amplexicaùle L. HENBIT. (Fig. 346.) Biennial or annual, sparingly pubescent; stems weak, slender, ascending or decumbent, 6′–20′ long. Leaves orbicular or nearly so, coarsely crenate, ¼′–1½′ wide, rounded at the apex, the lower slender-petioled; flowers in axillary and terminal clusters; calyx pubescent, its teeth erect, nearly as long as the tube; corolla purplish or red, 6″–8″ long, its tube very slender, the lateral lobes of its lower lip very small. [*Glecoma hederacea* of Millspaugh.]



Common in waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized in North America. Flowers nearly throughout the year.

Lamium purpùreum L., RED DEAD-NETTLE, also European, has all the leaves petioled and nearly erect, stouter stems, the similar flowers red-purple. Lefroy says it was a common weed at his time, and Reade records it as found on waysides and in cultivated grounds prior to 1883, but it has not been observed by recent collectors. H. B. Small's record would indicate that he had a purple-flowered plant of the preceding species in mind.

4. LEONÙRUS L.

Tall herbs, with palmately cleft, parted or dentate leaves, and small white or pink flowers verticillate in dense axillary clusters. Calyx tubular-campanulate, 5-nerved, nearly regular and equally 5-toothed, the teeth rigid, subulate or aristate. Corolla-limb 2-lipped; upper lip erect, entire; lower lip spreading or deflexed, 3-lobed, the middle lobe broad, obcordate or emarginate. Anthers 2-celled, the sacs mostly parallel. Nutlets 3-sided, smooth. [Greek, lion's-tail.] About 10 species, of Europe and Asia. Type species: *Leonurus Cardiaca* L.



1. Leonurus sibíricus L. SIBERIAN MOTHERWORT OR LION'S-TAIL. (Fig. 347.) Biennial, puberulent or glabrate; stem 2°–6° high. Leaves long-petioled, 3-parted into ovate or lanceolate, acute or acuminate, cleft and incised segments, the lobes lanceolate or linear, acute; the uppermost linear or lanceolate; clusters dense, usually all axillary; calyx campanulate, 3″ long, glabrous or puberulent; corolla purple or red, puberulent without, 4″–6″ long.

Frequent in waste grounds and along roads. Naturalized. Native of eastern Asia. Naturalized in the West Indies, and in Delaware and Pennsylvania. Flowers from spring to autumn.

Leonurus Cardiàca L., MOTHERWORT, also European, differs in having the leaves palmately 3–5-cleft. It is listed by Lefroy and recorded by Reade as found in fields.

5. LEONÒTIS R. Br.

Annual or perennial caulescent herbs or shrubby plants. Leaves opposite, broad, toothed, petioled, the flowers short-pedicelled in dense whorls. Calyx-tube 10-nerved, oblique at the mouth, its lobes 8–10, unequal, bristle-tipped. Corolla yellow, orange or scarlet, 2-lipped, the tube dilated above, curved; upper lip erect, rather long; lower lip with 3 lobes, the middle lobe scarcely longer than the lateral. Stamens 4; filaments all anther-bearing; anthers 2-celled; sacs diverging. Nutlets 3-angled, smooth. [Greek, lion's-ear.] About 12 African species. Type species: *Leonotis Leonitis* (L.) R. Br.

1. Leonotis nepetaefòlia R. Br. TALL LEONOTIS. LION'S-EAR. (Fig. 348.) Annual, softly pubescent. Stems 1°–6° tall, rather stout, simple or branched; leaves ovate or ovate-deltoid, 1½′–5′ long, coarsely crenate, cuneate or subcordate at the base; clusters dense, about 2′ in diameter; pedicels about 1″ long; calyx puberulent, becoming about 1′ long, its tube reticulated above the middle, its lobes 8, awn-tipped; corolla scarlet or orange-yellow, about 1′ long, villous-hirsute, its tube curved, the upper lip as long as the tube, the lower lip much shorter than the upper, with 3 narrow lobes; nutlets 1½″ long, angled. [*Phlomis nepetaefolia* L.]

Frequent in waste and cultivated grounds. Naturalized. Native of the Old World tropics. Naturalized in the southern United States, the West Indies and tropical continental America.



6. STÀCHYS [Tourn.] L.

Annual or perennial caulescent herbs, with glabrous or pubescent foliage, the leaves opposite, entire or toothed, commonly petioled, the flowers in axillary clusters, the upper clusters sometimes approximate or contiguous. Calyx mostly campanulate, its tube 5–10-ribbed, its 5 lobes equal or nearly so. Corolla purple, white, red or yellow, 2-lipped, the upper lip erect, entire or notched, the lower spreading, with 3 lobes, the middle lobe largest, entire or 2-lobed. Stamens 4; filaments all anther-bearing; anthers 2-celled, the sacs mostly diverging. Nutlets blunt at the apex. [Greek, a spike, from the spicate inflorescence.] About 160 species, of wide geographic distribution. Type species: *Stachys germanica* L.

1. Stachys arvénsis L. Corn or Field Woundwort. (Fig. 349.) Annual, hirsute; stem slender, diffusely branched, 2° long, or less. Leaves ovate or ovate-oblong, thin, long-petioled, obtuse, crenate, cordate or the upper rounded at the base, about 1′ long; lower petioles commonly as long as the blades; clusters 4–6-flowered, in the upper axils and in short terminal spikes; calyx about 3″ long, its teeth lanceolate, acuminate; corolla purplish, 3″–5″ long. [*Stachys arvensis bermudiana* Millsp.]

Frequent in waste and cultivated grounds. Naturalized. Native. Naturalized in the eastern United States and in Jamaica. Flowers from spring to autumn.



7. SÁLVIA [Tourn.] L.

Herbs, or some species shrubs, with clustered flowers, the clusters mostly spiked, racemed, or panicled. Calyx mostly naked in the throat, 2-lipped; upper lip entire or 3-toothed; lower lip 2-cleft or 2-toothed. Corolla strongly 2-lipped; upper lip entire, emarginate or 2-lobed; lower lip spreading, 3-cleft or 3-lobed. Anther-bearing stamens 2 (the posterior pair wanting or rudimentary); connective of the anthers transverse, linear or filiform, bearing a perfect anther-sac on its upper end, its lower end dilated, capitate or sometimes bearing a small or rudimentary one. Nutlets smooth, usually developing mucilage and spiral tubes when wetted. [Latin, salvus, safe, from its healing virtues.] About 500 species, of wide distribution. Type species: *Salvia officinalis* L.

Flowers 1′ long, scarlet. 1. *S. coccinea*.
Flowers 3″–5″ long, blue or white. 2. *S. serotina*.



1. Salvia coccínea L. SCARLET SAGE. (Fig. 350.) Annual, softly pubescent. Stems erect, 1°–2½° tall, simple or sparingly branched. Leaves ovate or deltoid-ovate, 1′–2½′ long, obtuse or acutish, crenate-serrate, truncate to subcordate at the base; panicles 2′–8′ long; pedicels 1″–3″ long, slender; calyx minutely pubescent, 5″–6″ long, its tube many-ribbed, the upper lip reniform, abruptly pointed, the lower lobes ovate, apiculate; corolla deep scarlet, about 1′ long, puberulent, the tube contracted above the base, then gradually enlarged, the lower lip merely notched at the apex; nutlets about 1″ long, slightly variegated.

Common on banks and along roads. Naturalized. Native of the southern United States and Mexico. Flowers from spring to autumn, the corolla soon falling away after expanding.



2. Salvia serótina L. SMALL WHITE SAGE. (Fig. 351.) Perennial, finely pubescent. Stems 6′–2½° tall, much branched; leaves ovate or orbicular-ovate, ½′–1¼′ long, obtuse, crenate-serrate, truncate or subcordate at the base, slender-petioled; panicles 1′–4′ long; calyx longer than the pedicels, glandular-hirsute, becoming 3″–4″ long; lips about ⅓ as long as the long-campanulate tube; corolla white or blue, 3″–5″ long, its tube included; style glabrous; nutlets fully 1″ long. [*S. tenella* of Millspaugh.]

Common in waste grounds. Naturalized. Native of Florida and the West Indies. Flowers from spring to autumn.

Salvia occidentàlis Sw., West Indian, a trailing species with a very small glandular calyx, light blue corolla about 3″ long, the flowers in racemed whorls, the ovate serrate leaves 1′ long or less, is recorded by Hemsley as collected in Bermuda by Lane, and at Walsingham by Moseley, but no subsequent collector has found it. Lefroy thought that Lane's plant was probably *S. coccinea*, and Moseley's specimen could not be found in the Kew Herbarium in 1910.

Salvia splèndens Sellow, SCARLET SALVIA, SCARLET SAGE, Brazilian, much grown for ornament, is 2°–3° high, with slender-petioled thin ovate acuminate serrate glabrous leaves 2′–4′ long, and terminal racemes of large scarlet flowers, the calyx about ¾′ long, the tubular corolla 1½′–2′ long.

Salvia ianthìna Otto & Dietr., LARGE PURPLE SALVIA, Mexican, also grown for ornament, resembles *S. splendens* in size and foliage, but the calyx is narrower, blue-purple, and the corolla is purple or violet-purple, nearly 2′ long.

Salvia purpùrea Cav., VELVETY PURPLE SALVIA, Mexican, mentioned by Reade as cultivated, has purplish corollas about 1′ long, the calyx white-tomentose.

Salvia officinàlis L., GARDEN SAGE, European, used for flavoring, is grown in some gardens. It is a white-woolly perennial with oblong or lanceolate petioled leaves, and rather small, white blue or purple flowers in whorls.

Salvia pàtens Cav., LARGE BLUE SALVIA, Mexican, occasional in flower-gardens, is a pubescent perennial, 1°–2° high, with petioled, deltoid-ovate or hastate, entire or crenate leaves 2′–3′ long, the large blue flowers opposite in terminal loose racemes, the linear bracts as long as the 2-lipped calyx or longer, the widely 2-lipped corolla about 2′ long.

8. ROSMARÌNUS [Tourn.] L.

A low shrub with narrow entire revolute-margined leaves, and blue or white flowers in short opposite axillary racemes. Calyx subcampanulate, 2-lipped, the upper lip 3-toothed, the lower lip 2-cleft. Corolla with a tube longer than the calyx, an expanded throat, and a 2-lipped limb, its upper lip notched, erect, the lower 3-cleft and spreading. Perfect stamens 2 ascending under the upper lip of the corolla, the filament continuous with the connective. Style 2-cleft. Nutlets smooth, ovoid. [Latin, sea-dew, from the habitat of this plant near the sea.] A monotypic genus of the Mediterranean region.

1. Rosmarinus officinàlis L. ROSEMARY. (Fig. 352.) A shrub up to 4° high, but usually lower, its slender, white-tomentose twigs densely leafy. Leaves linear, about 1′ long, white-woolly beneath, blunt, their margins strongly revolute; racemes few-flowered, little longer than the leaves; bracts ovate, acute, about 1½″ long; calyx ribbed, about 2″ long; lower lip of the corolla about thrice as long as the calyx, its middle lobe declined.



Rocky hillsides, St. David's Island, where it has been naturalized for many years. Flowers in spring. Occasional in cultivation. Its leaves are used for seasoning and oil of rosemary is distilled from them.

9. CLINOPÒDIUM L.

Herbs, or low shrubs, with entire or sparingly dentate leaves, and rather large flowers variously clustered. Calyx mostly gibbous at the base, about 13-nerved, 2-lipped, the upper lip 3-toothed, the lower 2-cleft. Corolla usually expanded at the throat, the tube straight, the limb 2-lipped; upper lip erect, entire or emarginate; lower lip spreading, 3-cleft. Stamens somewhat connivent in pairs, the longer mostly exserted; anthers 2-celled, the sacs divergent or divaricate. Nutlets ovoid, smooth. [Greek, bed-foot, the flowers likened to a bed-caster.] About 60 species, of the north temperate zone. Type species: *Clinopodium vulgare* L.



1. Clinopodium Calamíntha (L.) Kuntze. CALAMINT. CALAMINT BALM. (Fig. 353.) Perennial by creeping rootstocks, 1°–3° high. Leaves broadly ovate, petioled, obtuse at both ends or subacute at the apex, dentate or crenate-dentate, ½′–2′ long and nearly as wide; inflorescence paniculate, commonly leafy; calyx villous in the throat, 2″–3″ long; corolla purplish, 6″–7″ long. [*Melissa Calamintha* L.]

Common in waste grounds. Naturalized. Native of Europe. Flowers in summer and autumn. Commonly called Catnep and one of the abundant naturalized plants.

10. MÉNTHA [Tourn.] L.

Odorous herbs, with simple mostly punctate leaves, and small whorled purple pink or white flowers, the whorls axillary or in terminal spikes. Calyx 10-nerved, regular, or slightly 2-lipped, 5-toothed. Corolla-tube shorter than the calyx, the limb 4-cleft, the posterior lobe usually somewhat broader than the others, entire or emarginate. Stamens 4, equal, erect, included or exserted, sometimes imperfect; filaments glabrous; anthers 2-celled, the sacs parallel. Nutlets ovoid, smooth. [Name used by Theophrastus; from the nymph Minthe.] About 30 species, of the north temperate zone. Type species: *Mentha spicata* L. All the following mints grow luxuriantly in Bermuda.

Plants glabrous, or nearly so.
Spikes narrow, mostly interrupted; leaves nearly or quite sessile. 1. *M. spicata.*
Spikes thick, mostly dense; leaves petioled.
Leaves lanceolate to oblong, acute. 2. *M. piperita.*
Leaves ovate, obtuse or the upper acute. 3. *M. citrata.*
Plant tomentose-puberulent; leaves rugose-reticulated. 4. *M. rotundifolia.*

1. Mentha spicàta L. SPEARMINT. (Fig. 354.) Perennial by leafy stolons; stem erect, 1°–2° high. Leaves lanceolate, sessile or short-petioled, sharply serrate, acute or acuminate, the largest about 3′ long; whorls of flowers in spikes which become 2′–4′ long in fruit, the one terminating the stem surpassing the lateral ones; bracts subulate-lanceolate, ciliate; calyx campanulate, its teeth subulate, nearly as long as the tube; corolla glabrous. [*M. viridis* L.]



Common in wet or moist grounds. Naturalized. Native of Europe. Widely naturalized in North America. Flowers in summer and autumn.



2. Mentha piperita L. PEPPERMINT. (Fig. 355.) Perennial by subterranean suckers; stem 1°–3° high. Leaves lanceolate, petioled, dark green, acute, sharply serrate, glabrous on both sides, or pubescent on the veins beneath, the larger 1½′–3½′ long; whorls of flowers in spikes, which are obtuse, and become 1′–3½′ long in fruit, the middle one at length overtopped by the lateral ones; bracts lanceolate, acuminate; calyx tubular-campanulate, glabrous below, its teeth subulate, usually ciliate, one-half as long as the tube or more; corolla glabrous.

Frequent in marshes and ditches. Naturalized. Native of Europe. Widely naturalized in North America. Flowers in summer and autumn.



3. Mentha citràta Ehrh. BERGAMOT MINT. (Fig. 356.) Perennial by leafy stolons; stem weak, decumbent or ascending, 1°–2° long. Leaves petioled, thin, ovate or ovate-orbicular, obtuse or the upper acute at the apex, sharply serrate, the larger about 2′ long; whorls of flowers in terminal short obtuse spikes, and commonly also in the uppermost axils; calyx glabrous, its teeth subulate, one-half as long as the tube, or longer; corolla glabrous. [*M. aquatica hirsuta citrata* of Reade.]

Frequent in marshes. Naturalized. Native of Europe. Sparingly naturalized in the United States, and in the West Indies. Flowers in summer and autumn.

4. Mentha rotundifòlia (L.) Huds. ROUND-LEAVED MINT. (Fig. 357.) Perennial by leafy stolons, canescent or tomentose-puberulent, somewhat viscid, 3′–8′ high. Leaves elliptic, or ovate-oblong, short-petioled, or sessile and somewhat clasping by the subcordate or rounded base, obtuse, crenate-serrate, 2″–5″ long, rugose-reticulated beneath; whorls of flowers in spikes which elongate to 5″–10″ in fruit; bracts lanceolate, acuminate; calyx-teeth setaceous, usually about one-half as long as the tube; corolla puberulent. [*M. spicata rotundifolia* L.]

In waste places, on hillsides and along roads, rather common. Naturalized. Native of Europe. Widely naturalized in America. Flowers in summer and autumn.



Mentha arvénsis L., the CORN MINT, OR FIELD MINT of Europe, which has the flowers all whorled in the leaf-axils, is recorded by Lefroy as common in Pembroke Marsh prior to 1879 and also mentioned by H. B. Small, and by Jones, but repeated search has failed to reveal its presence there now, and it is not accredited to Bermuda by other authorities.

Scutellaria purpuráscens Sw., West Indian Skullcap, a low, purple-flowered Labiate, the calyx bearing a crest on the upper side, is recorded as Bermudan by Lefroy, who indicates it as naturalized, but it has not been observed by other botanists, and either the record or the determination are supposed to be erroneous. It is a plant unlikely to become naturalized.

Koellia mùtica (Michx.) Britton, one of the North American Mountain-mints, was credited to Bermuda by Rein, apparently an error in identification, but what plant that author had in mind has not been determined. [*Pycnanthemum muticum* Michx.]

Nepeta Catària L., Catnep or Catmint, European, an erect, finely tomentose perennial, with ovate, crenate-dentate leaves, the clusters of nearly white flowers in terminal spikes, the tubular calyx 15-nerved, is grown in gardens. Lefroy states that it was common in Pembroke Marsh prior to 1879, and erroneously indicates it as a native species. It is not known to be wild in Bermuda today. The plant commonly called Catnep here is *Clinopodium Calamintha*.

Marrubium vulgàre L., Horehound, European, occasionally grown in gardens, is an erect perennial, 1°–3° high, the stem whitish-woolly, the rugose dentate oval to nearly orbicular leaves 1′–2′ long, the whitish flowers in dense axillary clusters, the tubular calyx about 10-nerved.

Melissa officinàlis L., Balm or Bee-balm, European, occasional in gardens, is a hairy perennial, 1°–3° high, with blunt ovate toothed leaves, the small white flowers in axillary clusters, the oblong-campanulate calyx 13-nerved, 2-lipped.

Thymus vulgàris L., Thyme, is a low, shrubby plant, with slender, finely hairy stems up to 1° high, branched, and commonly matted; the thick, blunt, entire, dotted leaves are only 2″–5″ long, and the small purple flowers are in small glomerules, the 10–13-nerved calyx 2-lipped. It is frequently grown in gardens, or as a crop, and is native of southern Europe and western Asia.

Satureia montàna L., Winter Savory, European, occasionally cultivated for flavoring, is a perennial herb, with somewhat woody, branching stems, 1½° high or less, pointed narrowly oblong, punctate leaves 6″–10″ long, and small, white to lilac flowers in loose clusters.

Origanum Marjoràna L., Sweet Marjoram, European, grown in gardens for flavoring, is a perennial herb about 2° high, with slender, finely tomentose branches, gray-green oval obtuse entire petioled leaves about ½′ long and small purplish flowers in solitary or clustered oblong obtuse dense spikes about ⅓′ long, the calyx 2-lipped, the bracts suborbicular.

Ocimum basìlicum L., Basil, East Indian, cultivated for flavoring, is annual, 1°–1½° high, with thin petioled dentate, ovate to ovate-lanceolate leaves 1′–2′ long, and bluish or white small flowers whorled in interrupted terminal spikes, the calyx deflexed in fruit and strongly veined. Lefroy notes that it was introduced in 1616.

Lavendula spica Cav., White Lavender, of southern Europe, grown in gardens, is a perennial herb 1°–1½° high, with linear or linear-spatulate entire leaves 1′–3′ long, crowded below the middle of the stem, densely white-silvery, the small blue flowers in terminal, long-peduncled, short spikes, the 5-toothed calyx striate-nerved, the corolla-lobes nearly equal.

Coleus varieties are commonly planted as ornamentals for their colored and variegated foliage.

Family 9. **SOLANÀCEAE** Pers.

Potato Family.

Herbs, shrubs, vines, or some tropical species trees, with alternate or rarely opposite estipulate leaves, and perfect regular or nearly regular cymose flowers. Calyx inferior, mostly 5-lobed. Corolla gamopetalous, mostly 5-lobed, the lobes induplicate-valvate or plicate in the bud. Stamens as many as the lobes of the corolla and alternate with them, inserted on the tube, all equal and perfect in the following genera, except in *Petunia*, where 4 are didynamous and the fifth smaller or obsolete; anthers 2-celled, apically or longitudinally dehiscent. Ovary superior, 2-celled (rarely 3–5-celled); ovules numerous on the axile placentae, anatropous or amphitropous; style slender, simple; stigma terminal; fruit a berry or capsule. Seeds numerous; endosperm fleshy; cotyledons semiterete. About 75 genera and 1750 species, most abundant in tropical regions including many plants whose products are useful as foods and drugs, and also many cultivated for ornament.

A. **Fruit a berry.**

a. Corolla plicate, its lobes mostly induplicate.

Berry enclosed by the inflated accrescent calyx.
- Ovary 3–5-celled; sepals nearly separate. 1. *Physalodes.*
- Ovary 2-celled; sepals united to near their tips. 2. *Physalis.*

Berry subtended by the calyx.
- Anthers opening by terminal pores. 3. *Solanum.*
- Anthers opening lengthwise. 4. *Lycopersicon.*

b. Corolla not plicate, its lobes valvate or imbricate 5. *Capsicum.*

B. **Fruit a capsule.**

Capsule narrowly oblong, indehiscent. 6. *Brugmansia.*

Capsule globose to ovoid, dehiscent.
- Flowers solitary, axillary; corolla funnelform; capsule mostly spiny. 7. *Datura.*
- Flowers panicled or racemose; corolla mostly salverform; capsule unarmed. 8. *Nicotiana.*

1. **PHYSALÒDES** Boehm.

An annual erect glabrous herb, with alternate petioled thin sinuate-dentate or lobed leaves, and large light blue peduncled nodding flowers, solitary in the axils. Calyx-segments ovate, connivent, cordate or sagittate at the base, strongly reticulated. Corolla broadly campanulate, slightly 5-lobed. Stamens 5, included, inserted on the corolla near its base; filaments filiform, dilated and pilose below; anther-sacs longitudinally dehiscent. Style slender; stigma 3–5-lobed. Berry globose, nearly dry, enclosed in the calyx. [Greek, Physalis-like.]

A monotypic genus.

1. Physalodes physalòdes (L.) Britton. APPLE-OF-PERU. (Fig. 358.) Stem angled, 2°–5° high. Leaves ovate or oblong, acuminate but blunt, narrowed at the base, 3′–8′ long; petioles longer than the peduncles; flowers 1′–1½′ long and broad; corolla-limb almost entire; fruiting calyx 1′–1½′ long and thick, its segments acute, their basal auricles acute or cuspidate; berry 6″ in diameter, surrounded by the calyx. [*Atropa physalodes* L.; *Nicandra physalodes* Gaertn.]

Occasional in waste and cultivated grounds. Naturalized. Native of South America. Naturalized in the United States. Spring to autumn.



2. PHÝSALIS L.

Herbs, with entire or toothed leaves. Peduncles solitary. Calyx campanulate, 5-toothed, in fruit bladdery-inflated, 5-angled, or 10-ribbed enclosing the pulpy berry. Corolla mostly yellow, often with a brownish or purplish center, open-campanulate, plicate. Style slender; stigma minutely 2-cleft. Seeds numerous, kidney-shaped, flattened. [Greek, bladder.] Some 75 species, mostly American. Type species: *Physalis alkekengi* L.

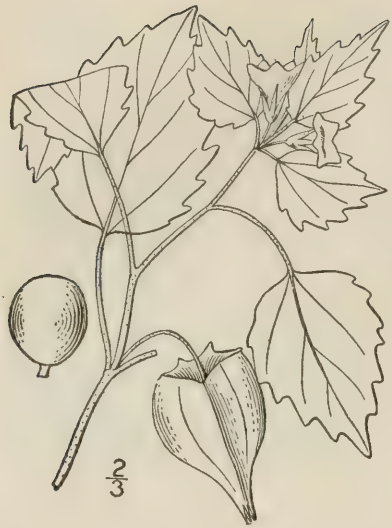
Annual species; fruiting calyx angular.
- Leaves obtuse or rounded at the base; corolla with a brown or purple eye.
  - Plant viscid-pubescent. 1. *P. pubescens.*
  - Plant glabrous, or pubescent only above. 2. *P. turbinata.*
- Leaves, or most of them, narrowed at the base; corolla yellow. 3. *P. angulata.*

Perennial species; fruiting calyx scarcely angled. 4. *P. peruviana.*



1. Physalis pubéscens L. HAIRY GROUND CHERRY. HORSE CHERRY. (Fig. 359.) Annual, pubescent and viscid. Stems tall and erect, or widely spreading, acutely 3–4-angled; leaves 1′–3′ long, heart-shaped, acute or generally abruptly acuminate, sharply repand-dentate, pubescent with short hairs; peduncles short, at maturity sometimes 10″ long; calyx generally densely viscid-hirsute; lobes lanceolate, acuminate, but not subulate-tipped; corolla 2″–5″ in diameter, yellow with a purplish eye; anthers generally purplish; fruiting calyx about 1′ long, retuse at the base. [*P. barbadensis* Jacq.]

Occasional in waste and cultivated grounds. Naturalized. Native of the southern United States and the West Indies. Summer and autumn.



2. Physalis turbinàta Medic. SMOOTH GROUND CHERRY. (Fig. 360.) Annual, glabrous, or minutely puberulent when young. Stems rather stout, acutely angled and divaricately branched; leaves broadly ovate, obtuse or cordate and slightly oblique at the base, thin and dark green, repand-dentate, short-acuminate; peduncles short, in fruit about 8″ long; calyx-lobes lanceolate, acuminate; corolla 4″–5″ wide, yellow with a purplish eye; fruiting calyx about 1½′ long, long-attenuate, almost pyramidal, deeply retuse at the base. [*P. obscura* Michx.; *P. Linkiana* of H. B. Small.]

Frequent in waste and cultivated grounds. Naturalized. Native of the southern United States and West Indies. Flowers in summer and autumn.

3. Physalis angulàta L. CUT-LEAVED GROUND CHERRY. COW CHERRY. BALLOON CHERRY. (Fig. 361.) Annual, glabrous. Stems angular, 1°–3° tall, branched; leaves ovate, usually sharply sinuate, with long-acuminate teeth, thin, 1½′–3′ long, mostly narrowed at base; petioles slender, ¾′–2′ long; peduncles slender, about 1′ long, erect, often reflexed at maturity, but seldom exceeding the fruiting calyx in length; calyx glabrous; lobes triangular to lanceolate, generally shorter than the tube; corolla 3″–5″ in diameter, unspotted; anthers more or less purplish tinged; fruiting calyx about 1′ long, ovoid, not prominently 5–10-angled, sometimes purple-nerved and at length nearly filled with the yellow berry. [*P. Linkiana* Dunal.]



Frequent in waste and cultivated ground. Naturalized. Native of the southern United States and tropical America. Flowers in summer and autumn.

4. Physalis peruviàna L. CAPE GOOSEBERRY. (Fig. 362.) Perennial by rootstocks, velvety-pubescent, branched, 2°–4° high. Leaves thin, flaccid, broadly ovate, 2′–4′ long, acuminate at the apex, cordate or subcordate at the base, the petioles half as long as the blades or less; peduncles ½′ long or less, recurved in fruit; corolla about 8″ broad, yellow, with a dark purplish eye; anthers violet; fruiting calyx 1′–1½′ long, ovoid, scarcely angled. [*P. edulis* of Lefroy.]

Waste grounds, escaped from cultivation, and locally naturalized. Native of South America. Flowers in spring and summer.



Physalis lanceolàta Michx., of the central and southern United States, a perennial species with spatulate or oblanceolate leaves, and yellowish corolla with a dark eye, given as Bermudian on the authority of Lane, is probably erroneously recorded.

3. SOLÀNUM [Tourn.] L.

Herbs, shrubs, or trees, often stellate-pubescent, some species climbing. Flowers cymose, umbelliform, paniculate, or racemose. Calyx campanulate or rotate, mostly 5-toothed or 5-cleft. Corolla rotate, the limb plaited, 5-angled or 5-lobed, the tube very short. Stamens inserted on the throat of the corolla; filaments short; anthers linear or oblong, acute or acuminate, connate or connivent into a cone, each sac dehiscent by a terminal pore, or sometimes by a short introrse terminal slit, or sometimes also longitudinally. Ovary usually 2-celled; stigma small. Berry mostly globose, the calyx either persistent at its base or enclosing it. [Name, according to Wittstein, from *solamen*, quieting.] About 1000 species, of wide geographic distribution. Type species: *Solanum nigrum* L.

Plant unarmed; berries small, black. 1. *S. nigrum*.
Plant copiously armed with yellow prickles; berries large, scarlet. 2. *S. aculeatissimum*.



1. Solanum nigrum L. BLACK OR GARDEN NIGHTSHADE. (Fig. 363.) Annual, glabrous, or somewhat pubescent with simple hairs, 1°–3° high. Leaves ovate, petioled, more or less inequilateral, ½′–3½ long, thin, acute or acutish, entire or coarsely toothed; peduncles lateral, umbellately 3–10-flowered; pedicels 3″–8″ long; flowers 4″–5″ broad; calyx-lobes oblong, or ovate, much shorter than the white corolla, persistent at the base of the berry; filaments somewhat pubescent; anthers obtuse; berries black, glabrous, globose, 4″–5″ in diameter, on nodding peduncles. [*S. nodiflorum* Jacq.]

In waste places or cultivated soil, rather common, and occasional in rocky woodlands. Native. Temperate and tropical regions generally, consisting of many slightly differing races. Flowers from spring to autumn. Its seeds were probably transported to Bermuda by a bird.

2. Solanum aculeatissimum Jacq. COCKROACH BERRY. (Fig. 364.) Perennial, slightly woody, usually much branched, 2°–4° high, somewhat pilose or becoming glabrous, the branches, petioles, leaf-blades and peduncles armed with straight yellow prickles. Leaves thin, broadly ovate in outline, 3′–6′ long, pinnately lobed or repand; cymes few-flowered, lateral; calyx armed with stout prickles, about one-third as long as the corolla, its lobes ovate, acute; corolla white, about 6″ broad; anthers ovate-lanceolate; berry globose, scarlet, glabrous, ½′–¾′ in diameter.



Roadsides and waste grounds, occasional. Naturalized. Native of tropical America. Flowers in summer and autumn.

Solanum torvum Sw., BUSHY WHITE SOLANUM, tropical American, a tall bushy species, common as a weed in the West Indies, tomentose nearly all over, and armed with nearly straight yellowish prickles, the ovate angular-lobed leaves 8′ long or less, scabrous above, the white flowers about ½′ broad, in lateral cymes, the globose berries about 4″ in diameter, is one of the few plants mentioned by Grisebach in "Flora of the British West Indies," as

inhabiting Bermuda. It is also recorded as a weed by Lefroy, who regarded it as a native plant, and mentioned by Jones, but subsequent collectors have failed to find it wild. It was planted at the Agricultural Station some years ago, and was seen there in 1914

Solanum tuberòsum L., POTATO, South American, is one of the very important crops of Bermuda, and has been cultivated since the early days of the colony.

Solanum Melongéna L., EGG-PLANT, Asiatic, cultivated for its large edible fruit, is a perennial, tomentose and prickly species with purplish flowers nearly 2′ wide, the globose to oval fruit sometimes a foot in length. [*S. ovigerum* Dunal.]

Solanum Rantonnètii Carr., BLUE POTATO-BUSH, South American, grown for ornament in gardens, is a glabrous shrub up to 6° high, with slender-petioled thin entire ovate to elliptic leaves about 3″ long, few-flowered, axillary clusters of slender-pedicelled, dark blue-purple flowers, the corolla nearly 1′ broad, the red, drooping berries ½′–¾′ in diameter.

Solanum Seaforthiànum Andr., SEAFORTH'S POTATO-VINE, of tropical America, grown on walls or trellises for ornament, is a long, somewhat woody, nearly or quite glabrous vine, with thin leaves, either pinnately parted or entire, 6′ long or less, their segments ovate or lanceolate, acute or acuminate; the purple or lilac flowers are 8″–12″ broad, borne in peduncled axillary compound cymes, on slender pedicels, followed by globose yellowish or reddish berries about 4″ in diameter.

Solanum jasminoìdes Paxton, JASMINE POTATO-VINE, South American, is similar to *S. Seaforthianum*, but sometimes puberulent, and with nearly white flowers in short clusters, is occasionally grown for ornament. Its upper leaves are usually lanceolate and entire.

Solanum Wendlándii Hook, f., WENDLAND'S POTATO-VINE, Costa Rican, also an ornamental vine, grown on trellises and porches, is stouter than *S. Seaforthianum*, with somewhat prickly branches, its leaves larger the lower ones, at least, pinnately parted; the lilac-blue flowers are about 2′ broad, usually in large clusters.

Solanum robústum Wendl., COCKROACH POISON, Brazilian, seen at Orange Valley in 1914, is a densely velvety shrub about 6° high, the branches and leaves armed with slender, flattened prickles ½′ long or less, the ovate-elliptic, acute coarsely few-lobed leaves 5′–10′ long, on margined petioles decurrent on the twigs; the white flowers are about 8″ broad, in short racemes, the globose pubescent berries about 4″ in diameter.

4. LYCOPÉRSICON Mill.

Annual, or rarely perennial, coarse herbs, with 1–2-pinnately divided leaves, and lateral irregular raceme-like cymes of small yellowish flowers opposite the leaves. Calyx 5-parted, or rarely 6-parted, the segments linear or lanceolate. Corolla rotate, the tube very short, the limb 5-cleft or rarely 6-cleft, plicate. Stamens 5 (rarely 6), inserted on the throat of the corolla; filaments short; anthers elongated, connate or connivent, introrsely longitudinally dehiscent. Ovary 2–3-celled; style simple; stigma small, capitate. Berry in the wild plants globose or pyriform, much modified in cultivation, the calyx persistent at its base. [Greek, wolf-peach.] About 4 species, natives of South America, the following typical.



1. Lycopersicon Lycopérsicon (L.) Karst. TOMATO. LOVE-APPLE. CHERRY TOMATO. (Fig. 365.) Viscid-pubescent, much branched, 1°–3° high. Leaves petioled, 6′–1½° long, the segments stalked, the larger 7–9 ovate or ovate-lanceolate, mostly acute, dentate, lobed or again divided, with several or numerous smaller ones interspersed; flowers 5″–8″ broad; calyx-segments about equalling the corolla; berry the well-known tomato or love-apple. [*Solanum Lycopersicum* L.; *Lycopersicon esculentum* Mill.]

Frequent in waste grounds, and spontaneous after cultivation. Introduced. Native of South America. Flowers nearly throughout the year. Widely cultivated in all temperate and warm regions.

5. **CÁPSICUM** [Tourn.] L.

Annual or perennial herbs or shrubs, with forking stems. Leaves flat, entire or repand. Flowers solitary in the axils, or in small cymes. Calyx scarcely accrescent, of 5 wholly or partially united sepals. Corolla usually white, nearly rotate, its lobes 5, imbricated. Stamens 5, adnate to the base of the corolla; anthers bluish, the sacs opening lengthwise. Ovary 2–3-celled. Stigma club-shaped or dilated. Berries red, yellow or green, nodding, very pungent. Seeds flattened. [Latin, capsa, a box, referring to the shape of the fruit in forms of the typical species.] About 30 species, natives of America. Type species: *Capsicum annuum* L.



1. Capsicum baccàtum L. BIRD PEPPER. (Fig. 366.) Perennial, shrubby, more or less pubescent. Stems 3°–9° long, sometimes vine-like, widely branching; leaves ovate, oblong-ovate or ovate-lanceolate, 1′–2′ long, acute or acuminate, entire, abruptly narrowed or truncate at the base; petioles one-half as long as the blades or shorter; pedicels narrowly club-shaped, 5″–10″ long; calyx about 1½″ long, its lobes as long as the tube or somewhat shorter; berries globose to ellipsoid, 3″–5″ long, red, obtuse.

Rocky woodlands, occasional. Native. Southern United States and tropical continental America. Summer and autumn. Occasional in gardens.

Capsicum frutéscens L., SPANISH PEPPER, tropical American, also shrubby, grown in gardens, has larger oblong pointed berries, the calyx nearly truncate, the pedicels more or less enlarged under the calyx.

Capsicum ánnuum L., CHILLIES, GUINEA PEPPER, also of tropical America, grown for its large fruits, and recorded by H. B. Small as occasionally seen outside of plantations, is annual or biennial, herbaceous, its fruits often 3′ or 4′ long, very variable.

6. BRUGMÁNSIA Pers.

Shrubs or trees, with large alternate petioled leaves, and very large drooping, white or red flowers on solitary curved peduncles. Calyx angled, spathaceous or 5-cleft. Corolla long-funnelform, angular, the limb with 5 lanceolate acuminate lobes. Anthers included. Ovary 2-celled. Capsule spindle-form, unarmed. [In honor of S. J. Brugmans, professor in Leyden.] Three species, natives of Mexico and South America, the following typical.

1. Brugmansia arbòrea (L.) Steud. CORNUCOPIA. HORN OF PLENTY. (Fig. 367.) Much branched, 6°–15° high, the twigs stout, densely pubescent. Leaves ovate to oblong or ovate-lanceolate, pubescent on both sides, 6′–10′ long, entire or sinuate-dentate, acute or acuminate at the apex, rounded or acute and mostly inequilateral at the base, the pubescent petioles 1′–3′ long; peduncles 1′–2′ long; calyx 3′–4′ long, 2-cleft to about the middle; corolla white, 8′–10′ long, often double, its lobes 1′–2′ long; capsule 1½′–3′ long. [*Datura arborea* L.; *Brugmansia candida* Pers.]



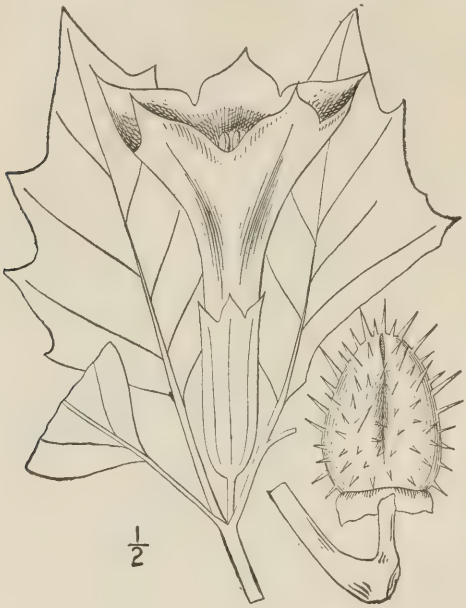
Occasional in waste grounds. Introduced, and commonly grown in gardens for ornament. Native of South America. Flowers from spring to autumn

Brugmansia suavèolens (H. & B.) G. Don, MOON-PLANT, Mexican, differs in having nearly or quite glabrous foliage and a 5-cleft calyx. [*Datura suaveolens* H. & B.]

7. DATÙRA L.

Tall narcotic herbs or shrubs, with alternate leaves, and large solitary erect short-peduncled white purple or violet flowers. Calyx elongated-tubular or prismatic, its apex 5-cleft or spathe-like, in the following species circumscissile near the base which is persistent and subtends the prickly capsule. Corolla funnelform, the limb plaited, 5-lobed, the lobes broad, acuminate. Stamens included or little exserted; filaments filiform, very long, inserted at or below the middle of the corolla-tube. Ovary 2-celled, or falsely 4-celled; style filiform; stigma slightly 2-lobed. Capsule 4-valved from the top, or 5-valved

irregularly. [The Hindoo name, dhatura.] About 12 species, of wide distribution. Type species: *Datura Stramonium* L.



1. Datura Stramònium L. STRAMONIUM. JAMESTOWN OR JIMSON WEED. THORN-APPLE. PURPLE STRAMONIUM. STINKING-WEED. (Fig. 368.) Annual, glabrous or the young parts sparingly pubescent; stem stout 1°–5° high. Leaves thin, ovate, acute or acuminate, mostly narrowed at the base, 3′–8′ long, irregularly sinuate-lobed, the lobes acute; flowers white or purple, about 4′ high; calyx prismatic, less than one-half the length of the corolla; capsule ovoid, densely prickly, erect, about 2′ high. [*D. Tatula* L.]

Common in waste places and cultivated ground. Native. West Indies and continental tropical America. Widely naturalized in temperate and tropical regions. Flowers in summer and autumn.



2. Datura Métel L. PRICKLY-BUR. (Fig. 369.) Annual, finely glandular-pubescent, 3°–9° high. Leaves broadly ovate, acute, inequilateral, obtuse or subcordate at the base, 4′–10′ long; flowers white, 6′–7½′ long; calyx about one-half as long as the corolla; capsule globose or ovoid-globose, prickly and pubescent, pendulous, 1′–1½′ in diameter.

Waste grounds. Recorded by previous authors but not found by us. Native of tropical America. Naturalized in the eastern United States.

Datura fastuòsa L., GARDEN DATURA, Asiatic, a tall glabrous herbaceous species, with repand leaves often 8′ long, the sharply toothed calyx 2′–3′ long, the white to purple corolla 6′–8′ long, often double or triple, with long-tipped lobes, the erect capsules about 2′ long, covered with short stout prickles, is grown for ornament.

8. NICOTÌANA [Tourn.] L.

Viscid-pubescent narcotic herbs or shrubs, with large alternate entire or slightly undulate leaves, and white yellow greenish or purplish flowers, in terminal racemes or panicles. Calyx tubular-campanulate or ovoid, 5-cleft. Corolla-tube usually longer than the limb, 5-lobed, the lobes spreading. Stamens 5, inserted on the tube of the corolla; filaments filiform; anther-sacs longitudinally dehiscent. Ovary 2-celled (rarely 4-celled); style slender; stigma capitate. Capsule 2-valved, or sometimes 4-valved at the summit. Seeds numerous, small. [Named for John Nicot, French ambassador to Portugal, who sent some species to Catherine de Medici, about 1560.] About 50 species, mostly natives of America. Type species: *Nicotiana Tabacum* L.

Annual herb with pink flowers. 1. *N. Tabacum.*
Shrub or tree with yellow flowers. 2. *N. glauca.*



1. Nicotiana Tabácum L. TOBACCO. (Fig. 370.) Annual, 3°–6° high, little branched. Leaves oblong to oblong-lanceolate, 4′–12′ long, sessile, acute or acuminate at the apex, narrowed at the base, the lower ones decurrent on the stem; calyx about ½′ long, its lobes ovate; corolla funnelform, about 2′ long, pink, its lobes triangular, acuminate; capsule longer than the calyx.

Occasional on walls and in waste grounds. Introduced. Native of continental tropical America but its original home unknown. Formerly extensively cultivated in Bermuda but very little at the present time; in 1903 the Botanical Station is recorded to have had enough seedlings to plant six acres. Flowers in summer and autumn.



2. **Nicotiana glaùca** Graham. TREE TOBACCO. (Fig. 371.) A branching shrub, or a tree becoming 20° tall. Leaves ovate or oblong-ovate, 2′–8′ long or sometimes larger, undulate, long or slender-petioled; panicles long; pedicels mostly less than 10″ long; calyx 6″ or 7″ long, its lobes lanceolate or triangular-lanceolate, shorter than the tube; corolla yellow or yellowish, about 1½′ long, the tube gradually enlarged to the slightly constricted throat; the limb about 5″ broad, the lobes broad but acutish; capsules narrowly ovoid or oblong-ovoid, 5″–6″ long.

Occasional in waste grounds. Introduced. Sometimes grown in gardens for ornament. Flowers in summer and autumn. It is native of South America and widely naturalized in the southwestern United States.

Nicotiana acuminàta (Graham) Hook., SHARP-LEAVED TOBACCO, South American, grown at Mt. Langton about 1875, has lanceolate acuminate undulate-margined leaves, the few flowers about 3′ long in terminal panicles. [*Petunia acuminata* Graham.]

Lycium halimifòlium Mill., MATRIMONY VINE, European, a woody climber, with spiny branches, glabrous entire oblong to spatulate acute leaves 1′–2′ long, small axillary purplish flowers turning yellowish, with funnelform corollas and slightly exserted stamens, as long as the style, followed by orange-colored oval berries, is recorded by Lefroy as found on David's Island, prior to 1879. [*L. vulgare* Dunal.]

Lycium chinénse Mill., Asiatic, a shrub with spatulate obtuse leaves, similar flowers to those of the Matrimony Vine, with the style longer than the stamens, is grown in a few gardens.

Cestrum Pàrqui L'Her., South American, was established at Mt. Langton in 1874, and flowered profusely, but H. B. Small records its subsequent disappearance. It is a glabrous shrub with lanceolate petioled entire acuminate leaves about 3′ long, the panicled flowers greenish yellow, the narrow corolla with a short spreading limb, very fragrant at night.

Cestrum noctùrnum L., NIGHT-BLOOMING CESTRUM, West Indian, occasionally planted for ornament, is a glabrous shrub, 12° high or less, with ovate-lanceolate to oblong, petioled acuminate leaves 3′–5′ long, and flowers in axillary panicles; the cup-shaped calyx is about 1½″ long, the yellow narrowly tubular corolla with a short limb is about 1′ long, the nearly white, globose berries about 5″ in diameter.

Brunfelsia americàna L., BRUNFELSIA, LADY-OF-THE-NIGHT, West Indian, a shrub 4°–7° high, with elliptic to obovate short-petioled leaves 2′–4′ long, long, usually solitary and terminal yellowish fragrant flowers, the narrow corolla-tube about 2½′ long, the spreading 5-lobed corolla-limb nearly 1′ wide, the fruit a yellow berry 8″–10″ in diameter, is occasionally grown for ornament and interest.

Brunfelsia fállax Duch., LONG-FLOWERED BRUNFELSIA, also West Indian, occasionally grown, has a similar corolla about 4′ long.

Petunia axillàris (Lam.) B. S. P., WHITE PETUNIA, Brazilian, grown in flower-gardens, is viscid-pubescent, about 1° high, with ovate to obovate thin entire leaves 1′–4′ long, the lower ones petioled; the slender-peduncled flowers are white, the corolla with a narrow tube 1′–1¾′ long, and abruptly spreading limb about as wide as the length of the tube. [*P. nyctaginiflora* Juss.]

Petunia violàcea Lindl., VIOLET PETUNIA, also South American, is similar to the preceding species, often lower and with somewhat smaller leaves and violet flowers with a broader corolla tube. The widely cultivated garden Petunias are hybrids between this species and *P. axillaris*, the flowers white, violet, or variegated. [*P. phoenicea* of Lefroy.]

Salpiglossis sinuàta R. & P., SALPIGLOSSIS, Chilean or Peruvian, a glandular-pubescent, viscid branched annual, with an erect stem 1°–2° high, the lower leaves narrowly oblong, 3′–4′ long, sinuate-lobed or toothed, narrowed into petioles, the upper leaves linear, smaller, sessile, entire, the broadly funnelform corollas about 2′ broad, variously colored, is grown in gardens.

Family 10. **SCROPHULARIÀCEAE** Lindl.

FIGWORT FAMILY.

Herbs, shrubs or trees, with estipulate leaves, and perfect mostly complete and irregular flowers (corolla wanting in one species of *Synthyris*). Calyx inferior, persistent, 4–5-toothed, -cleft, or -divided, or sometimes split on the lower side, or on both sides, the lobes or segments valvate, imbricate or distinct in the bud. Corolla gamopetalous, the limb 2-lipped, or nearly regular. Stamens 2, 4 or 5, didynamous, or nearly equal, inserted on the corolla and alternate with its lobes; anthers 2-celled; the sacs equal, or unequal, or sometimes confluent into one. Disk present or obsolete. Pistil 1, entire or 2-lobed; ovary superior, 2-celled, or rarely 1-celled; ovules anatropous or amphitropous, on axile placentae; style slender, simple; stigma entire; 2-lobed or 2-lamellate. Fruit mostly capsular and septicidally or loculicidally dehiscent. Seeds mostly numerous; endosperm fleshy; embryo small, straight or slightly curved; cotyledons little broader than the radicle. About 165 genera and 2700 species, widely distributed.

A. **Upper lip or lobes of the corolla external in the bud.**
  Anther-bearing stamens 5; corolla rotate. — 1. *Verbascum.*
  Anther-bearing stamens 2 or 4; corolla not rotate.
    Corolla spurred or saccate at the base.
      Corolla spurred.
        Leaves palmately veined. — 2. *Cymbalaria.*
        Leaves pinnately veined. — 3. *Kickxia.*
      Corolla saccate. — 4. *Maurandya.*
    Corolla neither spurred nor saccate.
      Shrubs with angular branches. — 5. *Russellia.*
      Low herbs. — 6. *Bramia.*
B. **Lower lip or lobes of the corolla external in the bud.**
  Corolla 4–6 lobed; leaves alternate; capsule oval. — 7. *Capraria.*
  Corolla 4 lobed; leaves opposite; capsule notched. — 8. *Veronica.*

1. VERBÁSCUM [Tourn.] L.

Biennial or rarely perennial, mostly tall herbs, with alternate leaves, and rather large flowers, in terminal spikes, racemes or panicles. Calyx deeply 5-cleft or 5 parted. Corolla flat rotate or slightly concave, 5 lobed, the lobes a

little unequal, the upper exterior, at least in the bud. Stamens 5, inserted on the base of the corolla, unequal; filaments of the 3 upper stamens, or of all 5, pilose; anther-sacs confluent into one. Ovules numerous; style dilated and flattened at the summit. Capsule septicidally 2-valved, the valves usually 2-cleft at the apex. Seeds rugose. [The Latin name of the great mullen; used by Pliny.] About 125 species, of the Old World. Type species: *Verbascum Thapsus* L.

Plant densely woolly; flowers in dense spikes. 1. *V. Thapsus.*
Plant sparingly pubescent; flowers in long racemes. 2. *V. virgatum.*



1. Verbascum Thápsus L. Great Mullen. Flannel-leaf. (Fig. 372.) Simple or with some erect branches, densely woolly with branched hairs, 1°–8° high. Leaves oblong, thick, acute, narrowed at the base, dentate or denticulate, 4′–12′ long, the basal ones margined-petioled; flowers yellow, ½′–1′ broad, sessile, numerous in dense elongated spikes; stamens unequal, the three upper shorter with white hairy filaments and short anthers, the two lower glabrous or nearly so with larger anthers; capsule about 3″ high.

Common in fields and in waste grounds. Naturalized. Native of Europe. Widely naturalized in North America. Flowers from spring to autumn. Sometimes called Dock-leaf.



2. Verbascum virgàtum With. Twiggy Mullen. (Fig. 373.) Annual or biennial, tall and wand-like, loosely pubescent, green, 4°–6° tall. Leaves crenate-dentate, the basal ones obovate-elliptic, obtuse, narrowed into slender petioles, the lower ones oblong or oblong-lanceolate, acutish, 3′–5′ long, narrowed into margined petioles, the upper lanceolate to ovate, acute, cordate-clasping at the base; raceme often 2° long, narrow; pedicels stout, 2″–3″ long in fruit, about as long as the lanceolate, glandular-pubescent fruiting calyx-lobes; corolla yellow, or white, 1′ broad or less.

Cultivated grounds, Warwick, and on Castle Point, 1914. Introduced. Native of Europe. Naturalized as a weed in the southwestern United States. Flowers in spring and summer.

2. **CYMBALÀRIA** Medic.

Perennial creeping or spreading herbs, with long-petioled, mostly lobed, palmately veined leaves, and solitary axillary white to violet flowers. Calyx 5-parted. Corolla irregular, 2-lipped, short-spurred; upper lip 2-lobed, lower lip 3-lobed; throat nearly or quite closed by the palate. Stamens 4, didynamous, ascending, included, the filaments filiform. Style very slender. Capsule dehiscent by 2 terminal 3-toothed pores. Seeds numerous, small. [From the Greek for cymbal.] About 9 species, of the Old World, the following typical.

1. Cymbalaria Cymbalària (L.) Wettst. KENILWORTH OR COLISEUM IVY. (Fig. 374.) Glabrous; stem trailing, often rooting at the nodes, 4′–12′ long. Leaves reniform-orbicular, 3–5-lobed, 3″–12″ in diameter, the lobes broad and obtuse; flowers blue or lilac, 4″–5″ long; peduncles slender, recurved, shorter than the petioles; calyx-segments lanceolate, acute; palate yellowish; capsule globose; seeds rugose. [*Antirrhinum Cymbalaria* L.; *Linaria Cymbalaria* Mill.]



Occasional on roadside walls and rocks. Introduced. Native of Europe. Introduced into the eastern United States. Flowers from spring to autumn.

3. **KÍCKXIA** Dumort.

Mostly annual spreading or creeping herbs, with pinnately veined, short-petioled leaves, and solitary axillary white yellow or variegated flowers. Calyx 5-parted. Corolla irregular, spurred, 2-lipped, the throat closed by the palate. Stamens 4, didynamous, included; filaments filiform. Capsule opening by 1 or 2 terminal slits, pores, or valves. Seeds ovoid, mostly rough or tubercled. About 25 species, natives of the Old World, the following typical. [In honor of Johann Kickx, professor in Ghent.]



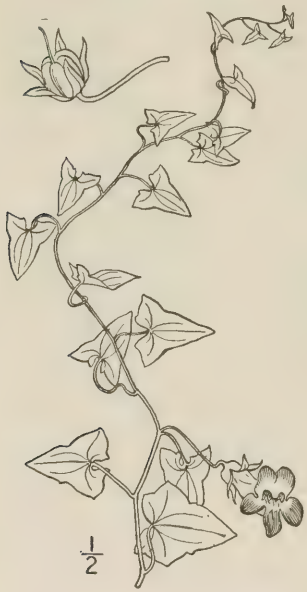
1. Kickxia Elatine (L.) Dumort. SHARP-POINTED FLUELLIN OR TOAD-FLAX. (Fig. 375.) Annual, pubescent; stems prostrate, 6′–2° long. Leaves ½′–1′ long, acute or obtuse at the apex, ovate or triangular, hastate, truncate, or subcordate at the base, entire, or few-toothed, the basal auricles divergent, acute; flowers about 3″ long; peduncles filiform; calyx-segments narrowly lanceolate, acute; corolla yellowish, purplish beneath, its spur slender, straight. Capsule sub-globose. [*Antirrhinum Elatine* L.; *Linaria Elatine* Mill.; *Evolvulus alsinoides* of Moore.]

Frequent in waste and cultivated grounds. Naturalized. Native of Europe. Naturalized in eastern North America. Flowers from spring to autumn.

4. **MAURÁNDYA** Ortega.

Annual or perennial vines, the leaves alternate, or opposite below, flat, hastate, angulate or coarsely toothed. Flowers on axillary peduncles. Sepals partially united. Corolla showy, pink, purple or violet, irregular, its tube scarcely gibbous at the base, with 2 often pubescent lines or plaits in the throat. Stamens 4, included; filaments thickened at the apex; anther-sacs often confluent. Styles with 2 dilated lobes at the apex. Ovules numerous. Capsule short, opening by transverse or irregular chinks. Seeds wrinkled or tuberculate. [In honor of Maurandy, a botanist of Cartajena.] About 6 species, of warm and tropical America. Type species: *Usteria scandens* Cav.

Corolla 7″–8″ long; sepals nearly as long as the corolla-tube. **1. *M. antirrhiniflora.***
Corolla 12″–15″ long; sepals shorter than the corolla-tube. **2. *M. scandens.***



1. Maurandya antirrhiniflòra (H. & B.) Willd. ROVING SAILOR. (Fig. 376.) Very slender, climbing to a length of 10° or more, glabrous throughout. Leaves triangular-hastate, acute, ½′–1′ long, slender-petioled; peduncles very slender, mostly longer than the petioles; sepals linear-lanceolate, acuminate, nearly as long as the corolla-tube; corolla purple, 7″–8″ long, its limb much shorter than its tube; capsule depressed-globose, about 5″ in diameter. [*Usteria antirriniflora* Poir.]

On walls and trees along roads. Introduced and escaped from cultivation. Native of the southwestern United States and Mexico. Flowers from spring to autumn. H. B. Small's description of *M. sempervirens* suggests this as the plant he had in mind.



2. Maurandya scàndens (Cav.) Pers. LARGER ROVING SAILOR. (Fig. 377.) Perennial, glabrous; similar to the preceding species, but stouter, and with larger leaves and flowers. Leaves triangular-hastate, 1′–1½′ long, the apex acuminate or acute; peduncles much longer than the petioles, sometimes longer than the leaves; sepals lanceolate, acuminate, one-third to one-half as long as the corolla-tube; corolla purple, 12″–15″ long, its limb about one-third as long as its tube; capsule globose, as long as the calyx. [*M. sempervirens* of Reade; *M. semperflorens* Jacq.; *Usteria scandens* Cav.]

Occasional on walls, banks and hedges. Native of Mexico. Flowers in summer and autumn. Frequently cultivated for ornament.

Maurandya Barclayàna Lindl., Barclay's Roving Sailor, Mexican, recorded as found in Bermuda by Reade, Lefroy, H. B. Small, Jones and as cultivated here, by Verrill, has flowers and leaves similar to those of *M. scandens*, but the sepals are densely glandular-pubescent. I have not met with it. H. B. Small's description points to *M. scandens*.

Maurandya erubéscens (Don) A. Gray, Red Maurandya, Mexican, is grown as an ornamental vine on porches and trellises, and locally seems established, as at Orange Valley; its stems and triangular-hastate leaves are pubescent, the ovate-lanceolate sepals nearly 1′ long, the rose-red corolla about 3′ long. [*Lophospermum erubescens* Zucc.]

5. **RUSSÉLLIA** Jacq.

Shrubby plants, with opposite or whorled leaves, sometimes reduced to mere scales, and cymose or panicled, mostly showy flowers. Calyx-lobes ovate. Corolla tubular, or tubular-funnelform, the tube long, the lobes short, somewhat unequal. Stamens 4, with divergent anther-sacs; no staminodes. Capsule ovoid to globose. [In honor of Alexander Russell, English physician and traveller, who died in 1786.] About 15 species, natives of tropical America. Type species: *Russellia sarmentosa* Jacq.



1. Russellia equisetiformis Schl. & Cham. Russellia. Heath. (Fig. 378.) A glabrous, much-branched shrub, 1½°–4° high, with spreading or arching striate branches, the twigs very slender. Leaves of the stem and branches, or most of them, reduced to acute scales about 1″ long, those of sterile twigs spatulate, 7″ long or less; calyx about 2″ long; corolla bright red, about 1′ long, its lobes ovate, 2″–3″ long; capsule ovoid. [*R. juncea* Zucc.]

Roadsides and banks, escaped from gardens, in which it is common. Introduced. Native of Mexico. Naturalized in the West Indies. Flowers from spring to autumn and is very showy.

6. **BRÀMIA** Lam.

Prostrate or diffuse herbs, with opposite obtuse mostly entire leaves, and small peduncled flowers, mostly solitary in the axils. Calyx subtended by 2 bracts, 5-parted, the upper segment the broadest. Corolla nearly regular, the tube cylindric, the limb 5-lobed. Stamens 4, didynamous, included. Style slender; stigma capitate, or 2-lobed. Capsule septicidally dehiscent. Seeds numerous. [From Brami, a Malabar name.] About 20 species, of warm and tropical regions. Type species: *Bramia indica* Lam.



1. Bramia Monnièra (L.) Drake. MONNIER'S HEDGE HYSSOP. (Fig. 379.) Perennial, glabrous, fleshy; stem creeping, rooting at the nodes, 3′–20′ long. Leaves spatulate or cuneate-obcordate, sessile, rounded at the apex, entire, or sparingly denticulate, 3″–10″ long; peduncles mainly in alternate axils, 2-bracteolate at the summit, in fruit longer than the leaves; flowers pale blue, about 5″ long; upper calyx-segment ovate, acute; corolla obscurely 2-lipped; stamens nearly equal; capsule ovoid, acute, shorter than the calyx. [*Gratiola Monniera* L.; *Herpestis Monniera* H.B.K.]

Common in moist grounds. Native. Southern United States, West Indies, tropical continental America and tropical Asia. Flowers from spring to autumn. Its minute seeds probably transported to Bermuda by a bird.

7. CAPRÀRIA L.

Perennial herbs or shrubby plants, the leaves alternate, longer than broad, toothed. Flowers on axillary peduncles. Calyx of 4–6 narrow, almost equal sepals. Corolla white, campanulate, with 4–6 flat lobes. Stamens usually 4; anther-sacs 2, divergent, confluent. Stigmas dilated or 2-lobed. Capsule short, 2-grooved, loculicidally dehiscent. Seeds reticulated. [Latin, from *capra* a nanny-goat.] About four species, of tropical and subtropical America, the following typical.



1. Capraria biflòra L. CAPRARIA. GOAT-WEED. (Fig. 380.) Stems 1°–3° tall, branching, sometimes pubescent. Leaves oblanceolate, cuneate or oblong, ½′–2′ long, acute, sharply serrate above the middle; peduncles solitary or 2 together, shorter than the subtending leaves; sepals linear-lanceolate to linear-subulate, 2″–3″ long; corolla about 5″ long, the tube campanulate, the lobes lanceolate, about as long as the tube; capsules oval or oval-ovoid, about as long as the sepals.

Occasional in waste grounds and along roads. Naturalized. Native of the southern United States and West Indies. Flowers in summer and autumn.

8. VERÓNICA [Tourn.] L.

Herbs (some exotic species shrubs or trees), with opposite and alternate, rarely verticillate leaves, and mostly small blue, purple, pink or white flowers, racemose, spicate, or solitary. Calyx mostly 4-parted, sometimes 5-parted. Corolla rotate, its tube very short, deeply and more or less unequally 4-lobed (rarely 5-lobed), the lower lobe commonly the narrowest. Stamens 2, divergent; anthers obtuse, their sacs confluent at the summit. Ovary 2-celled; style slender; stigma capitate. Capsule compressed, sometimes very flat, emarginate, obcordate, or 2-lobed, loculicidally dehiscent. Seeds flat, plano-convex, or excavated on the inner side. [Named for St. Veronica.] About 200 species, of wide distribution. Type species: *Veronica officinalis* L.

Pedicels as long as the subtending bracts, or longer. — 1. *V. agrestis.*
Pedicels shorter than the subtending bracts.
  Foliage pubescent. — 2. *V. arvensis.*
  Foliage glabrous or glandular. — 3. *V. peregrina.*

1. Veronica agréstis L. FIELD OR GARDEN SPEEDWELL. (Fig. 381.) Annual, pubescent; stems creeping or procumbent, very slender, 3′–8′ long, the branches ascending or spreading. Leaves broadly ovate or oval, obtuse at the apex, rounded, truncate or subcordate at the base, crenate, short-petioled, or the uppermost sessile, the lower opposite, the upper alternate and each with a slender-peduncled small blue flower in its axil; capsule broader than high, compressed, narrowly emarginate, 2″ broad.

In waste and cultivated grounds. Naturalized. Native of Europe. Naturalized in eastern North America and in Jamaica. Spring to autumn.



2. Veronica arvénsis L. CORN OR WALL SPEEDWELL. (Fig. 382.) Annual, pubescent; stem slender, at length much branched and diffuse, 3′–10′ long. Lower leaves ovate or oval, opposite, obtuse at both ends, crenate or crenulate, 2″–6″ long, the lowest petioled; upper leaves sessile, alternate, ovate or lanceolate, acute or acutish, commonly entire, each with a short-stalked flower in its axil; peduncles shorter than the calyx; corolla blue, or nearly white, 1″ broad or less; capsule broadly obovate, obcordate, 1″ high.

Frequent in waste and cultivated grounds. Naturalized. Native of Europe. Naturalized in North America, and in Jamaica. Spring to autumn.





3. Veronica peregrìna L. PURSLANE SPEEDWELL. NECKWEED. (Fig. 383.) Annual, glabrous, or glandular-puberulent; stem 3′–12′ high. Leaves oblong, oval, linear or slightly spatulate, 3″–10″ long, the lowest opposite, short-petioled, or sessile, broader than the upper and usually denticulate, the upper alternate, sessile, mostly entire, each with a short-peduncled flower in its axil; flowers nearly white, about 1″ broad; peduncles much shorter than the calyx; capsule nearly orbicular, obcordate, usually a little shorter than the calyx, 1″–1½″ high, the seeds flat.

Occasional in cultivated grounds. Naturalized. Native of North America where it is widely distributed. Naturalized in Jamaica. Flowers from spring to autumn.

Veronica salicifòlia Forst., WILLOW-LEAVED VERONICA, of New Zealand, recorded by Jones as grown in Bermuda in 1873, is a glabrous shrub, 6° high or more, with lanceolate entire leaves about 3′ long and numerous, white or blue flowers in axillary racemes.

Linaria Linària (L.) Karst., YELLOW SNAPDRAGON, TOADFLAX, European, is sometimes grown in flower-gardens. It is an herbaceous perennial, 1°–3° high, with linear entire leaves and terminal racemes of bright yellow flowers about 1′ long, the irregular spurred corolla with a palate nearly closing the throat; the capsule opens by pores. From Jones list of 1873, Reade's record of 1883, and that of H. B. Small, it would appear that they had observed this plant on roadsides and in waste places, but we have not seen it outside of cultivation in Bermuda. [*Antirrhinum Linaria* L.; *Linaria vulgaris* Mill.]

Pentstemon hirsùtus (L.) Willd., HAIRY BEARD-TONGUE, North American, collected in Bermuda by Rein about 1853, as would appear from a specimen preserved in the herbarium of the Berlin Botanical Garden, recorded in Rein's list as *Pentstemon pubescens* Soland., and admitted by Hemsley, has not been found by subsequent collectors. It may have been in cultivation, as its existence as a wild plant in Bermuda is doubtful. It is an herbaceous perennial, 3° high or less, nearly glabrous, with oblong to lanceolate, finely toothed leaves, and long clusters of rather showy purple flowers, the corolla about ¾′ long, the sterile stamen about as long as the four fertile ones.

A pubescent *Pentstemon* with lanceolate, entire leaves and large purplish flowers was seen in cultivation at Rose Cottage in 1914.

Antirrhinum màjus L., SNAPDRAGON, European, an herbaceous perennial with narrow leaves and terminal racemes of irregular flowers an inch or more long, the corolla of various colors from white to purple, saccate at the base, is common in flower gardens, blooming profusely in spring.

Mimulus lùteus L., YELLOW MONKEY-FLOWER, North American, recorded by Reade as a garden flower, is an herbaceous perennial, with broad toothed leaves and showy yellow axillary flowers over 1′ long, the corolla with a cylindric tube and a spreading 2-lipped limb, the four stamens all perfect.

Paulownia tomentòsa (Thunb.) Baill., PAULOWNIA, Japanese, grown at Norwood, is a tree, becoming 50° high or more, with broadly ovate petioled cordate leaves 5′–16′ broad, canescent on both sides when young, those of

shoots coarsely serrate, those of older stems mostly entire; the showy violet flowers, about 2′ long, are borne in large terminal panicles, the slightly irregular corolla puberulent; its fruit is an ovoid pointed capsule about 2′ long. [*Bignonia tomentosa* Thunb.; *Paulownia imperialis* Sieb. & Zucc.]

Family 11. **BIGNONIÀCEAE** Pers.

TRUMPET-CREEPER FAMILY.

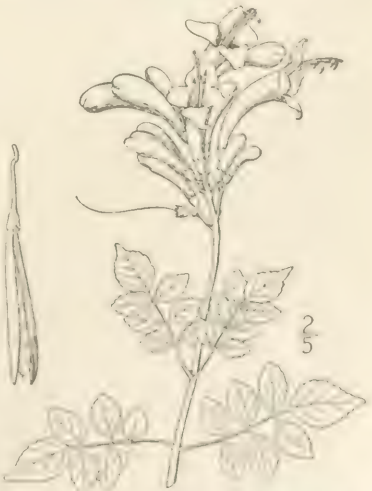
Trees, shrubs or woody vines, a few exotic species herbs, with opposite (rarely alternate) leaves, and mostly large and showy, clustered, more or less irregular flowers. Calyx inferior, gamosepalous. Corolla gamopetalous, 5-lobed, somewhat 2-lipped, at least in the bud. Anther-bearing stamens 2 or 4, inserted on the tube of the corolla and alternate with its lobes; anthers 2-celled, the sacs longitudinally dehiscent. Disk annular or cup-like. Ovary mostly 2-celled; placentae parietal, or on the partition-wall of the ovary; ovules numerous, horizontal, anatropous; style slender; stigma terminal, 2-lobed. Capsule 2-valved. Seeds flat, transverse, winged in our genera; endosperm none; cotyledons broad and flat, emarginate or 2-lobed; radicle short, straight. About 60 genera and over 500 species of wide distribution in tropical regions, a few in the temperate zones.

Leaves pinnate; vine-like shrubs. 1. *Tecomaria.*
Leaves digitate or unifoliolate; trees or erect shrubs. 2. *Tabebuia.*

1. **TECOMÀRIA** Spach.

Vines or shrubs, with opposite petioled pinnate leaves, the leaflets serrate, and showy flowers in terminal panicles or racemes. Calyx short, regular, 5-toothed. Corolla irregularly funnelform, the tube mostly curved, the limb somewhat 2-lipped. Stamens exserted, the filaments filiform. Style slender, exserted. Capsule linear, compressed. Seeds winged. [Name from similarity to *Tecoma*.] Two or three species, natives of South Africa, the following typical.

1. Tecomaria capénsis (Thunb.) Spach. CAPE TRUMPET-FLOWER. (Fig. 384.) Shrubby, 4°–8° high, or half-climbing, the twigs and leaves glabrous or minutely pubescent. Leaves 4′–6′ long; leaflets 5–9, ovate, elliptic, or the lower obovate, acute or bluntish at the apex, mostly narrowed at the base, short-stalked, rather coarsely serrate, 2′ long or less; flowers in short terminal panicles; corolla bright orange-red, about 2′ long, the curved tube about 3 times as long as the spreading limb; capsule flattened, about 2′ long, and 2″ wide. [*Bignonia capensis* Thunb.; *Tecoma capensis* Lindl.]



Along roads and in waste grounds, escaped from cultivation. Naturalized. Extensively planted for hedges and finely ornamental. Native of South Africa. Naturalized in the West Indies. Flowers freely and conspicuously in summer and autumn.

2. **TABEBÙIA** Gomez.

Trees or shrubs, with digitately 1–7-foliolate leaves, and mostly large and showy corymbose or solitary flowers. Calyx tubular, or tubular-campanulate, more or less irregularly toothed. Corolla funnelform, its tube gradually expanded, its spreading, somewhat irregular limb 5-lobed. Stamens didynamous, included, the anther-sacs diverging. Ovary 2-celled. Fruit a linear loculicidal capsule. Seeds flat, winged at both ends. [Brazilian name.] About 50 species, natives of tropical America. Type species: *Bignonia Tabebuya* Vell.



1. Tabebuia pállida Miers. WHITE CEDAR. (Fig. 385.) A tree, up to 60° high, the foliage and inflorescence glabrous. Leaves 1–5-foliolate; petioles 1′–4′ long; leaflets elliptic to oblong-elliptic or elliptic-obovate, 6′ long or less, stalked, or the lower ones sometimes sessile, pinnately veined, minutely lepidote on both sides; corymbs terminal, several-flowered; pedicels slender; calyx somewhat oblique, lepidote, about 5′ long; corolla pink or nearly white, about 2½′ long; capsule 5′–8′ long, about 3″ thick; seed-wings 4″–5″ long. [*Bignonia leucoxylon* L., not *Tabebuia leucoxyla* DC.; *Tecoma pentaphylla* of Lefroy, of Reade and of H. B. Small; *Tabebuia pentaphylla* of Verrill.]

Hedges and roadsides. Naturalized. Widely planted for shade and ornament. Native of the West Indies. Flowers in summer and autumn, sometimes when nearly devoid of leaves.

Tabebuia serratifòlia (Vahl) Nicholson, SHOWY TABEBUIA, of the southern Lesser Antilles, seen at Pembroke Hall in 1913, is a tree 30° high or more, with long-petioled, digitately 5-foliolate leaves, the obovate to elliptic, stalked acuminate leaflets 3′–5′ long, the petioles and calyx rusty-tomentose, the bright yellow flattened 5-lobed narrowly campanulate corolla about 2½′ long. [*Bignonia serratifolia* Vahl.]

Tecoma stáns (L.) Juss., TRUMPET-FLOWER, tropical American, a shrub, or small tree up to 30° high, with rough furrowed bark, pinnate leaves of 7 or 9 lanceolate sharply toothed leaflets and terminal clusters of large yellow flowers is frequently planted for ornament. [*Bignonia stans* L.; *Stenolobium stans* Seemann.]

Pyrostegia ígnea (Vell.) Presl, COMELY TRUMPET-FLOWER, Brazilian, a long-climbing woody vine, with glabrous leaves of 2 ovate acuminate leaflets

and a tendril, or sometimes of 3 leaflets, showy orange-red flowers in axillary corymbs, the tubular corolla 2½′–3′ long, with a short 2-lobed limb, is planted for ornament. [*Bignonia ignea* Vell.; *B. venusta* Ker.]

Bignònia radicans L., Trumpet-creeper, Red Trumpet-flower, North American, frequently planted for ornament, is a high-climbing, woody vine, sometimes 30° long, with pinnate leaves of 7–11 broad toothed leaflets and terminal corymbs of red and orange flowers, the tubular-campanulate corolla nearly 2′ broad, the spindle-shaped pods 4′–6′ long. [*Tecoma radicans* Juss.]

Bignonia obliqua H.B.K., Caracas Bignonia, Venezuelan, recorded by Jones, is a vine, the leaves with 2 cordate shining leaflets and red flowers.

Bignonia buccinatòria Mairet, Red Bignonia, Mexican, a vine with 4-angled branches, the petioles and inflorescence tomentose, the leaves of 2 ovate or elliptic leaflets and a tendril, the clustered, blood-red flowers 4′ long, is also recorded by Jones as grown in Bermuda. Neither this nor the next preceding species are true *Bignonias*.

Anisóstichus capreolàta (L.) Bureau, Cross-vine, North American, a high-climbing vine, with leaves of 2, broad leaflets and a tendril, the orange red flowers in axillary clusters was introduced at Mt. Langton in 1874, but subsequently disappeared, according to H. B. Small. [*Bignonia capreolata* L.]

Anemopaegma carrerénse Armitage, Carrera Vine, of Trinidad and Venezuela, a glabrous vine, with petioled leaves of 2 ovate or ovate-lanceolate, thin leaflets 2′–3′ long, axillary flowers, few in each cluster, 2½′ long, the short calyx truncate, the funnelform, nearly white corolla with a yellow throat, the oval fruit about 3′ long, is occasionally planted for ornament.

Pandorea jasminoides (Lindl.) Schum., Jasmine Pandorea, of New South Wales, seen at Spring Haven in 1914, is a glabrous, high-climbing vine, with pinnate, petioled leaves of 5 or 7 ovate-lanceolate leaflets 1′–2′ long, and white flowers in panicles, the corolla about 1½′ long, with broad, spreading lobes. [*Tecoma jasminoides* Lindl.]

Kigelia pinnàta (Jacq.) DC., Kigelia, of tropical Africa, occasionally planted, is a tree up to 50° high, with pinnate glabrous leaves whorled in 3s, the 7 or 9 obovate or oblong sessile leaflets 2′–5′ long; the large clustered flowers are red, or crimson, the corolla broadly campanulate and 2-lipped; the fruit is oblong-cylindric, indehiscent, up to 1½° long and 4′ or 5′ thick, slightly compressed, rounded at the apex. [*Crescentia pinnata* Jacq.]

Crescentia Cujète L., Calabash, tropical American, occasionally planted, is an evergreen tree, up to 25° high, with long-branches, spatulate or oblanceolate entire clustered leaves 4′–6′ long, yellowish flowers about 2½′ long, the calyx leathery, the corolla tubular-campanulate with short crisped lobes; the fruit is globose or oval, smooth, green, turning dark brown, 6′–12′ long, indehiscent, with a very hard rind, which is utilized for baling boats, holding water and other fluids.

Enallagma latifòlia (Mill.) Small, Black Calabash, of Florida and the West Indies, recorded by Jones as found in Bermuda, has oblong to obovate leaves, the fruit 2½′–4′ long, with a brittle shell. [*C. cucurbitina* L.]

Macrocatalpa longíssima (Jacq.) Britton, "French Oak," West Indian, was represented in the collection at the Agricultural Station by a fine young tree, flowering in the autumn of 1913. It has oblong-lanceolate, slender petioled acuminate thin leaves 3′–6′ long, and white flowers in terminal panicles, the tipped calyx deeply 2-lobed, the campanulate corolla 5-lobed, the lobes crisped; the narrowly linear drooping capsules are 1° 2° long. [*Catalpa longissima* Sims.; *Bignonia longissima* Jacq.]

Spathodea campanulàta Beauv., Spathodea, of tropical Africa, a tree with pinnate leaves 1° long or more, of 7–17 ovate nearly entire acute leaflets 3′–4′ long, the terminal clustered irregular showy orange flowers 3′–4′ long,

the calyx curved and longitudinally split, was also represented at the Agricultural Station in 1914 by a vigorous young tree, and by a tall tree in Victoria Park.

Seedling plants of a species of *Jacaranda*, presumably South American, were seen at the Agricultural Station in 1914. This genus consists of shrubs and trees with pinnate or bipinnate leaves and terminal panicles of mostly blue flowers.

Family 12. **GESNERIÀCEAE** Lindl.

GESNERIA FAMILY.

Herbs or shrubs with opposite, often unequal leaves, and variously clustered or solitary, often showy, perfect irregular flowers. Calyx mostly inferior, gamosepalous. Corolla gamopetalous, the limb usually oblique and more or less 2-lipped. Stamens 4, or sometimes 2, borne on the corolla-tube. Ovary 1-celled, or imperfectly 2-celled; ovules numerous, minute, anatropous, on parietal placentae. Fruit mostly capsular, many-seeded. About 90 genera and over 1000 species, of tropical and subtropical distribution. There are no native nor naturalized species of this family in Bermuda.

Isoloma Tydaèa Bailey, MONKEY-FLOWER, Colombian, a glandular-villous herbaceous species 1°–2° high, with petioled ovate often cordate, serrate more or less mottled leaves 2′–4′ long, the axillary flowers long-peduncled, the calyx 4″–5″ long, with 5 triangular lobes, the irregular corolla about 1½′ long, red and yellow, its lobes spotted, is grown in flower-gardens. [*Achimenes picta* Benth.]

Lefroy records the occurrence of a species of *Gloxinia* in gardens.

Family 13. **ACANTHÀCEAE** J. St. Hil.

ACANTHUS FAMILY.

Herbs, or some tropical genera shrubs or small trees, with opposite simple estipulate leaves, and irregular or nearly regular perfect flowers. Calyx inferior, persistent, 4–5-parted or 4–5-cleft, the sepals or segments imbricated. Corolla gamopetalous, nearly regularly 5-lobed, or 2-lipped. Anther-bearing stamens 4, didynamous, or 2 only; anther-sacs longitudinally dehiscent. Disk annular, or cup-like. Ovary 2-celled; ovules 2–10 in each cavity, anatropous or amphitropous; style filiform, simple; stigmas 1 or 2. Capsule dry, 2-celled, loculicidally elastically 2-valved. Seeds not winged, borne on curved projections (retinacula) from the placentae, the testa close, mostly roughened, often developing spiral threads and mucilage when wetted. Endosperm in the following genera none; cotyledons flat, commonly cordate. About 175 genera and 2000 species, natives of temperate and tropical regions.

1. **JUSTÍCIA** [Houst.] L.

Herbs, or shrubs, with entire leaves, the flowers variously clustered. Calyx deeply cleft, its segments narrow, nearly equal. Corolla-tube mostly shorter than the 2-lipped limb, the upper lip 2-cleft, the lower 3-cleft. Stamens 2, borne in the throat of the corolla; anthers 2-celled; staminodes none; lower anther-sac minutely appendaged. Style filiform; ovules 2 in each ovary-cavity. Capsule oblong. [In honor of James Justice, a Scotch gardener.] Over 100 species, of tropical distribution. Type species: *Justicia Adhatoda* L.

1. Justicia secùnda Vahl., Red Justicia. (Fig. 386.) Shrubby, 8° high or less, puberulent above, the stems and branches nearly terete. Leaves ovate-oblong to ovate-lanceolate, 8′ long or less, rather thin, long-acuminate at the apex, mostly obtuse or rounded at the base; panicles terminal, narrow, 4′–10′ long; pedicels very short; bracts subulate, about 1″ long; calyx-segments linear-lanceolate, 3″–4½″ long; corolla red or red-purple, about 1½′ long, its lips longer than its tube; capsule about 5″ long.



Banks and thickets, locally escaped from cultivation. Introduced. Native of the West Indies. Flowers in summer and autumn.

Thunbergia alàta Bojer, Winged Thunbergia, African, a softly pubescent vine up to 6° long, with broad-petioled ovate hastate acute leaves, and solitary axillary long-peduncled large-bracted flowers, the calyx many-toothed, the corolla yellow or white, often with a dark eye, the globose capsule long-beaked, is commonly grown in gardens.

Thunbergia fràgrans Roxb., White Thunbergia, East Indian, a nearly glabrous slender vine sometimes 9° long, with slender-petioled ovate or ovate-lanceolate, entire or few-toothed leaves and solitary axillary bracted long-stalked mostly white flowers, the calyx many-toothed, as in the preceding species, the subglobose capsule with a stout flattened beak, is occasionally grown, according to Reade.

Thunbergia grandiflòra Roxb., Large-flowered Thunbergia, East Indian, a strongly-growing stout roughish vine up to 20° long, the large leaves coarsely angulately toothed and cordate, the numerous large bracted white to purplish flowers racemose, with a truncate calyx, the capsule stout-beaked, is commonly grown for ornament.

Thunbergia erécta T. Anders., Bush Thunbergia, Asiatic, a slender shrub, up to 6° high, with thin entire ovate acuminate leaves, and large solitary short-peduncled axillary purple or white flowers, the capsule conic above the swollen base, is occasionally grown in gardens.

Thunbergia laurifòlia Lindl., Laurel-leaved Thunbergia, East Indian, a glabrous high-climbing woody vine, with opposite petioled ovate-lanceolate to oblong, firm leaves 4′–6′ long, the large showy flowers whorled in racemes on pedicels ½′–1′ long, the purple-blue corolla about 3′ broad, with a white throat and spreading 5-lobed limb was seen at Paget Rectory in 1914.

Graptophyllum pictum (L.) Griff., Caricature Plant, Australasian, a shrub 6° high or more, the elliptic acuminate entire short-petioled leaves 4′–8′ long, usually yellowish-blotched, the large crimson clustered flowers about 2′ long, the pubescent corolla strongly 2-lipped, with a narrow tube expanded above, is grown for ornament and interest. [*G. hortense* Nees; *G. versicolor* of Lefroy.]

Sanchesia nòbilis Hook. f., Brilliant-flowered Sanchesia, South American, occasional in flower-gardens, is a stout herbaceous plant, nearly glabrous, with bluntly 4-angled stems 2°–4° high; its oblong acuminate crenate

petioled leaves are 3′–10′ long, its bright yellow flowers about 2′ long, the tubular corolla with a small oblique limb; the showy large ovate bracts are bright red, the branches of the panicle purple.

Odontonema cuspidàtum (Nees) Kuntze, WHITE ODONTONEMA, Mexican, a nearly glabrous shrub about 6° high, with opposite short-petioled short-pointed, sometimes variegated leaves 3′–5′ long, the nearly white flowers in narrow terminal panicles, the whitish corolla nearly regular, the limb about ¾′ broad, about as long as the cylindric tube, is commonly planted for ornament. [*Thyrsacanthus cuspidatus* Nees.]

Rhacodiscus lùcidus (Andr.) Lindau, recorded by Lefroy as common in gardens, resembles *Justicia secunda*, but has much larger flowers in shorter panicles; it is recorded by Lefroy and by H. B. Small. [*Justicia lùcida* Andr.]

Barleria lupulìna Lindl., YELLOW BARLERIA, Madagascan, a glabrous shrub 3° high or less, with 2 slender spines ½′–1′ long in the axils of the elongated linear leaves, and bright yellow bracted flowers about 1¼′ long in dense terminal spikes, the corolla-limb with 3 large and 2 small lobes, is planted for ornament.

Eranthemum nervòsum (Vahl.) R. Br., BLUE ERANTHEMUM, East Indian, a somewhat pubescent or puberulent shrub 3°–6° high, with thin ovate to elliptic leaves 8′ long or less, acuminate at each end, axillary spicate flowers, the large whitish strongly veined bracts densely imbricated, acute or acuminate, the blue 5-lobed corolla nearly 1′ broad, is common in gardens. [*E. pulchellum* Andr.; *Justicia nervosa* Vahl.] This may be the "Blue Justicia" mentioned by Lefroy.

Eranthemum Andersòni Masters, ANDERSON'S ERANTHEMUM, Malayan, recorded by Lefroy, has lanceolate to elliptic leaves, and spicate purple-mottled flowers.

Eranthemum álbum (Roxb.) DC., WHITE ERANTHEMUM, of the East Indies, recorded by Lefroy and by H. B. Small, is a tall puberulent shrub, with elliptic or ovate-lanceolate, short-petioled leaves and white flowers in axillary panicled spikes, the narrow corolla 1′–1¼′ long, with a 2-lipped limb. [*Justicia alba* Roxb.]

Eranthemum reticulàtum Bull, YELLOW-VEINED ERANTHEMUM, Polynesian, taken to Paynter's Vale from the New York Botanical Garden in 1912 and growing there vigorously in 1914, is a shrub 3°–5° high, with glabrous somewhat fleshy, lanceolate to ovate-lanceolate, bluntly acuminate leaves, 2′–10′ long, the upper ones yellow-mottled, the lower yellowish-veined, the racemose flowers white, blotched red-purple.

Jacobinia magnífica (Nees) Benth., PINK JACOBINIA, Brazilian, a shrub about 5° high, with petioled, ovate or ovate-lanceolate, acuminate finely pubescent or glabrate leaves 4′–7′ long, and large terminal clusters of rose-colored flowers, the 2-lipped corolla about 2′ long, is occasionally grown for ornament. [*Justicia carnea* Hook.]

Jacobinia aurea (Schlecht.) Hemsl., YELLOW JACOBINIA, Central American, also grown for ornament, is a shrub up to 6° high, with finely puberulent or glabrous foliage, the broadly oval or ovate, petioled acuminate thin leaves 6′–10′ long; the yellow flowers are in long dense terminal clusters, the 2-lipped corolla about 2′ long.

Strobilanthes coloràtus (Nees) T. Anders., PURPLE STROBILANTHES, East Indian, occasional in flower gardens, is shrubby, about 3° high, its purple leaves ovate, acuminate, subcordate, short-petioled, serrate, 3′–7′ long, its

purple flowers about 1′ long, numerous in bracted terminal panicles. [*Goldfussia colorata* Nees.]

Strobilanthes isophýllus (Nees) T. Anders., Narrow-leaved Strobilanthes, also East Indian, about 2° high, with linear-lanceolate leaves 4′–8′ long and panicled bluish flowers was grown at the Public Garden, St. Georges, in 1912.

Fittonia argyroneùra E. Coëm., White-veined Fittonia, of western South America, commonly grown in green houses, and less successfully on rock work, is a pubescent perennial, with spreading or trailing branches, and broadly ovate rounded entire leaves 2′–3′ long, rather dark green, and conspicuously white-veined; the yellowish flowers of this plant are borne in peduncled narrow bracted spikes, the slender corolla with a long narrow lip.

Under the name *Cyrtanthera rosea*, Lefroy records a plant of this family grown in gardens at St. George's and at Mt. Langton, where it was brought from Ireland in 1874; I have been unable to identify this, there being no published species of that name.

Family 14. **MYOPORÀCEAE** Lindl.

Myoporum Family.

Shrubs or trees, with alternate or opposite, entire stipulate leaves, and perfect, more or less irregular flowers, solitary or clustered in the axils. Calyx inferior, 5-parted. Corolla gamopetalous, its limb 2-lipped or oblique. Stamens 4, mostly didynamous, borne on the corolla-tube, the filaments filiform. Ovary usually 2-celled; style terminal; stigma terminal and small; ovules 1 in each ovary-cavity. Fruit a drupe. Five genera and 80 species or more, mostly Australian, only the following American.

Bontia daphnoìdes L., Bontia, West Indian, a shrub or low tree, growing in 1913 in a garden in Smith's Parish, has lanceolate or oblong-lanceolate, entire somewhat fleshy, short-petioled acute faintly veined leaves 3′–4′ long, and peduncled flowers solitary in the upper axils, the peduncles longer than the petioles; the obconic calyx, about 2½″ long, has 5 ovate acute ciliate lobes; the yellowish, purple-mottled corolla is nearly 1′ long, tubular, 2-lipped, the upper lip nearly straight, the lower shorter and reflexed, pilose within, the longer pair of stamens a little exserted; its yellowish drupe is about ½′ long.

Family 15. **PHRYMÀCEAE** Schauer.

Lopseed Family.

An erect perennial herb with divaricate branches, opposite membranous simple leaves, and small irregular purplish flowers, distant in slender elongated spikes. Calyx cylindric, 2-lipped; upper lip 2-cleft, the teeth setaceous; lower lip much shorter, 3-toothed, the teeth subulate. Corolla-tube cylindric, the limb 2-lipped; upper lip erect, concave, emarginate; lower lip larger, spreading, convex, 3-lobed, the lobes obtuse. Stamens 4, didynamous, included. Ovary oblique, 1-celled; ovule 1, orthotropous, ascending; style slender; stigma 2-lobed. Calyx reflexed in fruit, enclosing the dry achene, becoming prominently ribbed, closed and its teeth hooked at the ends. Cotyledons convolute; radicle superior. Consists of the following:

1. PHRŸMA L.

A monotypic genus. [Name unexplained.]



1. **Phryma Leptostàchya L.** Lopseed. (Fig. 387.) Puberulent; stem somewhat 4-sided, sometimes constricted above the nodes, branched above, the branches slender, elongated, divergent. Leaves ovate, acute or acuminate, coarsely dentate, 2′–6′ long, the lower petioled, the upper often nearly sessile; spikes very narrow, 2′–6′ long; flowers about 3″ long, mostly opposite, distant, borne on very short minutely 2-bracteolate pedicels, at first erect, soon spreading, the calyx, after flowering, abruptly reflexed against the axis of the spike.

Collected in Bermuda only by Lefroy and by Moseley. Introduced. Native of eastern North America and eastern Asia. I have examined a specimen. Lefroy records this species as a weed of American origin. Recent collectors have been unable to find it in Bermuda, but there appears to be no doubt that it formerly existed here, probably only as a waif, however.

Order 6. PLANTAGINÀLES.

Only the following family:

Family 1. PLANTAGINÀCEAE Lindl.

Plantain Family.

Herbs, with basal, or, in the caulescent species, opposite or alternate leaves, and small perfect polygamous or monoecious flowers, bracteolate in spikes or heads, or rarely solitary. Calyx 4-parted, inferior, peristent, the segments imbricated. Corolla hypogynous, scarious or membranous, mostly marcescent, 4-lobed. Stamens 4 or 2 (only 1 in an Andean genus), inserted on the tube or throat of the corolla; filaments filiform, exserted or included; anthers versatile, 2-celled, the sacs logitudinally dehiscent. Ovary sessile, superior, 1–2-celled, or falsely 3–4-celled. Style filiform, simple, mostly longitudinally stigmatic. Ovules 1–several in each cavity of the ovary, peltate, amphitropous. Fruit a pyxis, circumscissile at or below the middle, or an indehiscent nutlet. Seeds 1–several in each cavity of the fruit; endosperm fleshy; cotyledons narrow; radicle short, mostly straight. Three genera and over 225 species, of wide distribution.

1. PLANTÀGO L.

Leafy-stemmed, short-stemmed or acaulescent herbs, with opposite, alternate or basal leaves, bearing axillary or terminal spikes or heads of small

greenish or purplish flowers. Calyx-segments equal, or two of them larger. Corolla salverform, the tube cylindric, or constricted at the throat, the limb spreading in anthesis. Fruit a membranous pyxis, mostly 2-celled. Seeds various, sometimes hollowed out on the inner side. [The Latin name.] Over 200 species, of wide geographic distribution. Type species: *Plantago major* L.

Corolla-lobes spreading or reflexed in fruit.
Leaves ovate; seeds several in each pyxis. 1. *P. major.*
Leaves narrowly oblong-lanceolate; seeds only 2 in each pyxis. 2. *P. lanceolata.*
Corolla-lobes erect and closing over the top of the pyxis; seeds 2–4. 3. *P. virginica.*

1. Plantago màjor L. Common, or Greater Plantain. (Fig. 388.) Perennial, glabrous or pubescent; rootstock short, thick, erect. Leaves long-petioled, mostly ovate, entire, or coarsely dentate, 1′–6′ long, 3–11-ribbed; scapes 2′–2° high; spike linear-cylindric, usually dense, commonly blunt, 2′–6′ long, 3″–4″ thick; flowers perfect; sepals broadly ovate to obovate, scarious margined, one-half to two-thirds as long as the obtuse or subacute, 5–16-seeded pyxis which is circumscissile at about the middle; stamens 4.

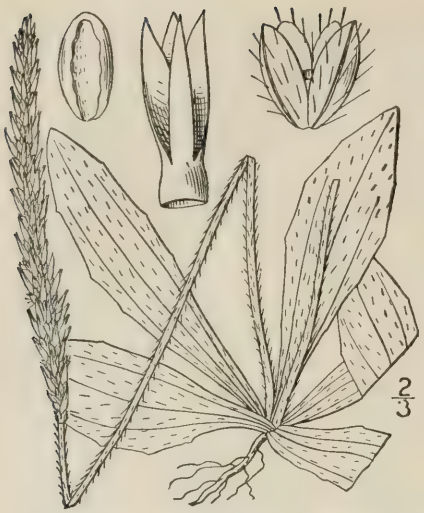
Common in waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized nearly all over the world. Flowers nearly throughout the year.





2. Plantago lanceolàta L. Ribwort. Rib-grass. (Fig. 389.) Perennial or biennial, pubescent; rootstock short, erect, with tufts of hairs at the bases of the leaves. Leaves narrowly oblong-lanceolate, shorter than the scapes, entire, acute or acuminate, gradually narrowed into petioles, 3–5-ribbed, 2′–12′ long; scapes slender, channelled, 6′–2° tall; spikes dense, at first ovoid, becoming cylindric, blunt and 1′–4′ long in fruit, 4″–6″ thick; flowers perfect; sepals ovate, with a narrow green midrib and broad scarious margins, the two lower ones commonly united; corolla glabrous; filaments white; pyxis oblong, very obtuse, 2-seeded, slightly longer than the calyx, circumscissile at about the middle.

Common in grassy places, waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized in North America. Flowers nearly throughout the year. In Bermuda the plant is frequently clothed with long silvery hairs.



3. Plantago virgínica L. Dwarf or White Dwarf Plantain. (Fig. 390.) Annual or biennial, pubescent or villous; scapes erect, much longer than the leaves. Leaves spatulate or obovate, thin, entire, or repand-denticulate, narrowed into margined petioles, or almost sessile, 3–5-nerved; spikes dense, or the lower flowers scattered, linear-cylindric, obtuse, 3″–4″ thick, flowers imperfectly dioecious; corolla-lobes of the fertile plants erect and connivent on the top of the pyxis, those of the sterile spreading; stamens 4; pyxis oblong, about as long as the calyx, 2–4-seeded.

Occasional in waste and cultivated grounds. Naturalized. Native of North America. Flowers from spring to autumn.

Plantago Rugélli Dene., Rugel's Plantain, North American, was doubtfully recorded as Bermudian by Jones. It differs from *P. major* by its pyxis being circumscissile much below the middle.

Order 7. RUBIÀLES.

Corolla gamopetalous. Anthers separate, the stamens as many as the corolla-lobes and alternate with them (one fewer in *Linnaea* of the Caprifoliaceae) or twice as many. Ovary compound, inferior, adnate to the calyx-tube; ovules 1 or more in each cavity. Leaves opposite or verticilate.

Leaves always stipulate, usually blackening in drying.	Fam. 1. Rubiaceae.
Leaves usually estipulate, not blackening in drying.	Fam. 2. Caprifoliaceae.

Family 1. RUBIÀCEAE B. Juss.

Madder Family.

Herbs, shrubs, or trees, with simple, opposite or sometimes verticillate, mostly stipulate leaves, and perfect, often dimorphous or trimorphous, regular and nearly symmetrical flowers. Calyx-tube adnate to the ovary, its limb various. Corolla funnelform, club-shaped, campanulate, or rotate, 4–5-lobed. Stamens as many as the lobes of the corolla and alternate with them, inserted on its tube or throat. Ovary 1–10-celled; style simple or lobed; ovules $1-\infty$ in each cavity. Fruit a capsule, berry, or drupe. Seeds various; seed-coat membranous or crustaceous; endosperm fleshy or horny (wanting in some exotic genera); cotyledons ovate, cordate, or foliaceous.

A large family of some 346 genera including about 6000 species, of wide geographic distribution, most abundant in the tropics.

A. Ovules several or many in each ovary-cavity.	
Flowers axillary.	1. *Randia.*
Flowers terminal.	2. *Casasia.*
B. Ovules only 1 in each ovary-cavity.	
Shrubs or trees.	
Ovules pendulous; flowers racemose.	3. *Chiococca.*

Ovules not pendulous; flowers not racemose.
Flowers terminal, corymbose or panicled. 4. *Psychotria.*
Flowers clustered in the axils. 5. *Coffea.*
Low herbs.
Leaves opposite.
Both carpels dehiscent. 6. *Borreria.*
One carpel dehiscent, the other indehiscent. 7. *Spermacoce.*
Leaves verticillate.
Calyx-limb none or obsolete.
Flowers 3 together, their pedicels connate, the middle flower fertile. 8. *Vaillantia.*
Pedicels separate; flowers all fertile. 9. *Galium.*
Calyx-lobes subulate, persistent. 10. *Sherardia.*

1. **RÁNDIA** [Houst.] L.

Evergreen shrubs or trees, the leaves opposite. Flowers perfect, solitary, usually axillary. Calyx-lobes 4. Corolla funnelform, salverform or campanulate, its lobes 5, convolute. Stamens 5, adnate to the throat of the corolla; filaments short or nearly wanting. Disk annular or cushion-like. Ovary 2-celled or very rarely 3–4-celled; styles usually united, stout, terminating in a club-shaped, spindle-shaped or rarely cleft stigma. Berry usually 2-celled. Seeds free or in a pulp, the testa thin, the endosperm horny. [In honor of Isaac Rand, English apothecary.] About 100 species, natives of tropical regions. Type species: *Randia mitis* L.



1. Randia aculeàta L. Box Briar. (Fig. 391.) A branching shrub, 3°–9° tall, often spiny, the foliage glabrous or nearly so. Leaves often clustered, spatulate, obovate, elliptic, oval or suborbicular, ½′–1′ long, narrowed into short petioles; flowers short-stalked; calyx-lobes triangular or ovate; corolla white, 3″–4″ long; its lobes oblong, shorter than the tube; berries subglobose or oval, white, 4″–6″ long. [*Scolosanthus Sagraeanus* of Millspaugh; *Randia latifolia* of Jones.]

Abundant in sandy soil, Paget and Warwick; also in Paget Marsh. Native. Florida and the West Indies. Said by Lefroy (Botany of Bermuda, p. 81) to be "an interesting example of local naturalization" but on p. 139 of the same work he indicates it as a native species, which it certainly appears to be. Flowers in summer and autumn. From Reade's description of *Rachicallis rupestris* it would seem that he had this plant in mind. Its fruits may have reached Bermuda by floating.

2. **CASÀSIA** A. Rich.

Shrubs or trees, with terete branches. Leaves opposite, leathery; stipules deciduous. Flowers perfect, in short peduncled cymes. Calyx turbinate or campanulate, truncate or with 5 or 6 obtuse sepals, persistent. Corolla white or yellow, salverform or nearly rotate; pubescent in the throat, its lobes 5 or 6, spreading, contorted. Stamens 5 or 6, adnate to the mouth of the corolla-tube; anthers sessile. Disk cup-like. Ovary 1–2-celled; styles stout. Ovules numerous in each cavity. Fruit a thick pulpy berry. Seeds numerous, angled. [In honor of Luis de las Casas, Captain General of Cuba.] About 8 species, of Florida and the West Indies. Type species: *Casasia calophylla* A. Rich.



1. Casasia clusiifòlia (Jacq.) Urban. SEVEN-YEAR APPLE. (Fig. 392.) A branching shrub, 3°–8° tall, the foliage glabrous, turning black in drying. Leaves clustered, leathery, obovate to cuneate, 2′–6′ long, rounded or retuse at the apex, lustrous, often mucronate, entire, short-petioled; calyx-tube 4″–5″ long, turbinate, the lobes subulate, shorter than the tube; corolla fleshy, glabrous, its tube 7″–10″ long, its lobes lanceolate or oblong-lanceolate, shorter than the tube; berries ovoid to obovoid, 2′–3′ long. [*Genipa clusiifolia* Griseb.]

Rocky slope near Castle Point, 1912. Native. Florida, Bahamas, Cuba. Flowers in spring or early summer.

3. CHIOCÓCCA L.

Shrubs, with upright or climbing stems, the leaves opposite, leathery, lustrous; stipules persistent. Flowers perfect, in axillary simple or compound racemes or panicles. Calyx-tube obovate or turbinate, its 5 lobes persistent. Corolla funnelform, with a glabrous throat; lobes 5, spreading or reflexed, valvate. Disk cushion-like. Stamens 5, essentially free from the corolla-tube. Ovary 2-celled or rarely 3-celled; styles united, filiform; stigmas terete, sometimes clavate. Ovules solitary in each cavity, pendulous. Fruit white, flattened, leathery, sometimes 2-lobed. Seeds pendulous, flattened, the testa membranous, the endosperm fleshy. [Greek, snow-berry.] About 7 species, natives of warm-temperate and tropical America. Type species: *Chiococca racemosa* L. [*C. alba* (L.) Hitchc.]



1. Chiococca bermudiàna S. Brown. BLOLLY. BERMUDA-SNOW-BERRY. (Fig. 393.) A shrub, 2°–6° high, or sometimes vine-like and 10°–15° long, glabrous, the rather stout branches light green, terete or nearly so. Leaves elliptic to ovate, 2′–4½′ long, ¾′–2½′ wide, firm in texture, light green on both sides, slightly darker above than beneath, acute or short-acuminate at the apex, narrowed at the base, the midvein rather prominent on both sides, the lateral veins few, relatively obscure, the stout petioles 6″ long or less; stipules low and broad, mucronate; panicles about as long as the leaves; flowers numerous, fragrant; pedicels rather stout, 2″–4″ long; calyx turbinate-campanulate, about 1″ long, its lobes triangular, acutish, much shorter than the tube; corolla yellow, 4″–5″ long, its tube narrowly funnelform, about twice as long as the ovate-lanceolate lobes; stamens borne at the

base of the corolla-tube, the filaments ½″ long, much shorter than the anthers; style as long as the corolla-tube; fruit compressed, becoming subglobose, pure white, shining, 3″–4″ long, the withering corolla long-persistent. [*Chiococca racemosa* of Lefroy, Reade, Jones, Hemsley and H. B. Small.]

Frequent on hillsides. Endemic. Flowers in autumn, the fruit ripe in winter. The glossy foliage, beautiful flowers and fruit make this one of the most attractive and interesting plants of Bermuda. It was long supposed to be identical with *C. alba*, of Florida and the West Indies, its nearest relative; the species was first described by Stewardson Brown in "Proceedings of the Academy of Natural Sciences of Philadelphia," 1909, p. 493. It differs from *C. alba* by lighter green foliage, larger leaves, stouter and longer pedicels and larger berries, and is a much more elegant plant when in bloom; as remarked by Lefroy, it is well worthy of cultivation; it is readily grown as shown by a number of small plants taken to the New York Botanical Garden in 1912.

The species probably originated from seeds of *Chiococca alba* transported to Bermuda from Florida or the Bahamas by a bird, there producing plants which subsequently, through isolation, developed differently from their ancestor.

4. PSYCHÒTRIA L.

Shrubs or trees, or rarely perennial herbs, the entire-margined leaves opposite or rarely whorled; stipules sometimes sheathing. Flowers perfect or rarely polygamo-dioecious, in terminal or axillary clusters. Calyx short, mostly 5-lobed. Corolla white, pink, green or yellow, tubular, funnelform or campanulate, the tube straight, its lobes 5, or rarely 4 or 6, valvate. Stamens as many as the corolla-lobes, adnate up to the throat or mouth of the corolla-tube; anthers attached at the base. Ovary 2-celled; ovules solitary in each cavity, erect, anatropous. Fruit a small berry or drupe, often ribbed. Seeds erect, testa thin; endosperm sometimes ruminated. [From the Greek, to give life, with reference to supposed medicinal qualities.] Over 200 species, natives of tropical and warm-temperate America. Type species: *Psychotria asiatica* L.; the name *asiatica* was given by Linnaeus in error, the plant being Jamaican.

1. Psychotria ligustrifòlia (Northrop) Millsp. WILD COFFEE. (Fig. 394.) A glabrous shrub, 4°–8° high. Leaves oblong, or oblong-oblanceolate, 2′–4′ long, ½′–1½′ in width, rather firm in texture, pinnately few-veined, dark green and somewhat shining above, paler green and commonly with small tufts of hairs in the axils of the veins beneath, acute or acuminate at the apex, narrowed at the base into slender petioles 8″ long or less, the deciduous stipules sheathing, subulate-tipped; peduncles ½′–2′ long, slender; panicles several–many-flowered, 1′–2′ broad; flowers very nearly sessile, about 2″ long, the minute calyx 5-6-toothed, the white corolla tubular-campanulate; fruit oblong, several-ribbed, about 3″ long, dark red.



[*Myrstiphyllum ligustrifolium* Northrop; *Psychotria undata* of Lefroy, Moore, Hemsley and of H. B. Small.]

Frequent in rocky woodlands between Castle Harbor and Harrington Sound; Paget Marsh, 1914. Native. Florida, and the West Indies. Flowers in spring. Its seed was probably brought to Bermuda by a bird.

5. **CÓFFEA** L.

Shrubs or small trees, with broad leaves, and white fragrant flowers clustered in the axils. Calyx-tube turbinate or oblong. Corolla funnelform or salverform, the 4 or 5 oblong lobes obtuse or acutish, contorted. Stamens 4 or 5, borne at the mouth of the corolla, the filaments very short, the anthers linear, twisted or curved after dehiscence. Ovary 2-celled; ovules 1 in each cavity; style 2-branched. Berry oblong or globose containing 2 hard convex nutlets. [Name from the Arabic.] About 20 species, natives of the Old World, the following typical.



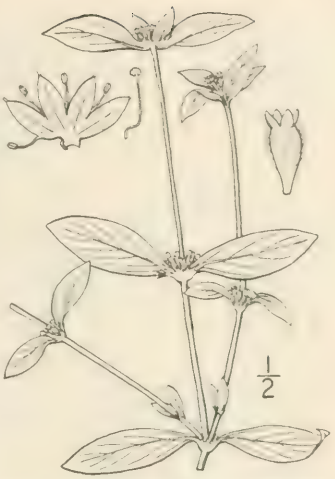
1. Coffea arábica L. COFFEE. (Fig. 395.) Glabrous, 10°–20° high, the trunk slender, usually straight. Leaves elliptic to oblong, dark green, somewhat shining, pinnately veined, 3′–6′ long, acute or acuminate at the apex, narrowed or obtuse at the base, the rather stout petioles ½′ long or less; flowers several together in the axils, short-pedicelled; calyx about 1½″ long, nearly truncate; corolla-tube 3″–5″ long, its lobes rather longer; anthers shorter than the corolla-lobes; berry oblong to globose, smooth, 5″–8″ long.

Abundant in rocky woodlands between Castle Harbor and Harrington Sound, a relic of former cultivation. Naturalized. Native of eastern tropical Africa. Flowers in spring and summer.

6. **BORRÈRIA** G. F. W. Meyer.

Annual or perennial herbs, or shrubby plants, with opposite entire leaves, the stipules sheathing, the flowers perfect, solitary in the axils, or in axillary or terminal clusters. Calyx-tube obovoid or turbinate, its lobes persistent, sometimes accompanied by small teeth. Corolla white, pink or blue, funnelform or salverform; the lobes 4, valvate, spreading. Stamens 4, adnate to the corolla-tube sometimes up to its throat. Disk obsolete or cushion-like. Ovary 2-celled; styles wholly or partially united; ovules solitary in each cavity, amphitropous. Fruit leathery or crustaceous, the 2 carpels opening along their inner faces. [In honor of W. Borrer, British lichenologist.] About 90 species, natives of tropical and warm regions. Type species: *Borreria suaveolens* G. F. W. Meyer.

1. Borreria laèvis (Lam.) Griseb. BUTTON-WEED. (Fig. 396.) Slightly pubescent, branched, the branches spreading or ascending, 6′–18′ long, somewhat angled. Leaves oblong to elliptic-lanceolate, ¾′–1½′ long, acute or acuminate at the base into short petioles, pinnately veined; stipular sheath subtruncate, bearing several bristles 2″–3″ long; flowers white, about 1½″ wide, capitate-clustered in the axils; calyx-lobes 4, ovate, minute; fruit obovoid, about 1″ long; seeds oblong, striate. [*Spermacoce laevis* Lam.]



Common in nearly all dry situations. Native. West Indies. Flowers nearly throughout the year. Its minute seeds were probably brought to Bermuda on the wind.

7. SPERMACÒCE L.

Annual or perennial herbs, the stems usually 4-angled, the leaves opposite; stipules sheathing. Flowers perfect, solitary or few in the axils. Calyx-lobes persistent, sometimes accompanied by small teeth. Corolla white, pink or blue, funnelform or salverform, the lobes spreading, valvate. Stamens 4, adnate to the throat of the corolla-tube or lower down. Ovary 2-celled; styles wholly or partially united, filiform; ovules solitary in each cavity, attached to the middle of the septa, amphitropous. Fruit leathery or crustaceous, of two carpels, one opening through the ventral face, the other remaining closed. [Greek, seed-point, from the sharp calyx-teeth surmounting the capsule.] About 4 species, natives of temperate and tropical America. Type species: *Spermacoce tenuior* L.



Plant glabrous or nearly so; leaves linear to oblong-lanceolate, 1″–3″ wide. 1. *S. tenuior.*

Plant pubescent with long hairs; leaves lanceolate, 4″–10″ wide. 2. *S. tetraquetra.*

1. Spermacoce tenùior L. SLENDER SPERMACOCE. (Fig. 397.) Glabrous or nearly so. Stems simple and erect or more or less diffusely branched from the base, the branches 4′–12′ long; leaves linear, oblong or oblong-lanceolate, ¾′–2′ long, acute or acuminate at both ends, narrowed into short petioles; calyx-lobes subulate or lanceolate-subulate; corolla white, twice or thrice as long as the calyx-lobes, its lobes broad, rounded, the fruit about 1″ long.

Waste and cultivated grounds. Naturalized. Native of temperate and tropical America. Flowers from spring to autumn.

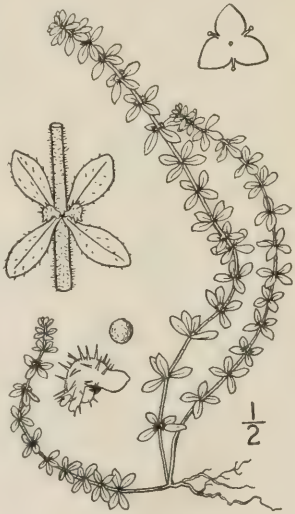


2. Spermacoce tetraquètra A. Rich. HAIRY SPERMACOCE. (Fig. 397.) Stouter and larger than *S. tenuior*, sometimes 2° high, densely pubescent nearly all over with long, whitish hairs. Leaves lanceolate to oblong-lanceolate, rather strongly veined, acute at the apex, narowed or obtuse at the base, 1′–3′ long, 10″ wide or less; calyx-lobes lanceolate, acuminate; corolla white, about twice as long as the calyx-lobes; fruit about 1″ long.

Common in waste and cultivated grounds. Naturalized. Native of Cuba and the Bahamas. Flowers in summer and autumn.

8. **VAILLÁNTIA** [Tourn.] L.

Low, annual branching herbs, with 4-angled stems, and small leaves verticillate in 4's, the very small white or yellowish flowers 3 together in the axils, very nearly sessile, the short pedicels connate, thickened and recurved in fruit, the lateral flowers staminate, the middle one perfect. Staminate flowers with an obsolete calyx, a rotate 3-cleft corolla and 3 stamens. Perfect flowers with a nearly globular calyx, a rotate, 4-cleft corolla, 4 stamens with didymous anthers, a 2-celled ovary and a 2-divided style; fruit concrete, 3–4-horned, spinulose. [In honor of Sebastian Vaillant, 1669–1722, French botanist.] A few species, natives of southern Europe, northern Africa and western Asia. Type species: *V. muralis* L.



1. Vailantia híspida L. HISPID VAILLANTIA. (Fig. 399.) Branched from the base, the slender branches spreading or ascending, 2′–8′ long, glabrous or nearly so below and when young throughout, becoming densely hispid with spreading hairs above the lower nodes. Leaves oblong, 5″ long or less, obtuse or acutish at the apex, narrowed into short petioles; flowers scarcely 1″ long, whitish; fruit with 3 short laciniate horns; seed hemispheric.

Frequent in grassy places. Naturalized. Native of Europe. Flowers in spring and summer.

Vaillantia muralis L., recorded by Jones and by Lefroy as found in Bermuda, has not with certainty been subsequently detected; it is glabrous throughout, or a little hairy at the ends of the branches, and has obovate leaves and smaller, less laciniate fruits.

9. GÀLIUM L.

Herbs, with 4-angled slender stems and branches, apparently verticillate leaves, and small flowers, mostly in axillary or terminal cymes or panicles, the pedicels usually jointed with the calyx. Flowers perfect, or in some species dioecious. Calyx-tube ovoid or globose, the limb minutely toothed, or none. Corolla rotate, 4-lobed (rarely 3-lobed). Stamens 4, rarely 3; filaments short; anthers exserted. Ovary 2-celled; ovules one in each cavity. Styles 2, short; stigmas capitate. Fruit didymous, separating into 2 indehiscent carpels, or sometimes only 1 of the carpels maturing. Seed convex on the back, concave on the face, or spherical and hollow; endosperm horny; embryo curved; cotyledons foliaceous. [Greek, milk, from the use of *G. verum* for curdling.] About 250 species, of wide distribution. Type species: *Galium Mollugo* L. The leaves are really opposite, the intervening members of the verticils being stipules.

Annual; leaves in 6's or 8's. 1. *G. Aparine.*
Perennials; leaves in 4's.
  Fruit dry, densely hispid. 2. *G. pilosum.*
  Fruit fleshy, pubescent. 3. *G. bermudense.*

1. Galium Aparine L. CLEAVERS. GOOSEGRASS. CLEAVER-WORT. (Fig. 400.) Weak, scrambling over bushes, 2°–5° long, the stems retrorsely hispid on the angles. Leaves in 6's or 8's, oblanceolate to linear, cuspidate 1′–3½′ long, 2″–5″ wide, the margins and midrib very rough; flowers in 1–3-flowered cymes in the upper axils; peduncles ½′–1′ long; fruiting pedicels straight; fruit 2″–5″ broad, densely covered with hooked bristles.

Occasional in waste and cultivated grounds. Naturalized. North temperate zone. Flowers in spring. This may be the plant mentioned by Reade as *G. palustre*, found once by him in Pembroke Marsh, and described under that name by H. B. Small.





2. Galium pilòsum Ait. HAIRY BEDSTRAW. (Fig. 401.) Perennial, hirsute-pubescent; stems ascending, branched, 1°–2½° long. Leaves in 4's, oval or oval-ovate, punctate, 1-nerved, obtuse, or obscurely 3-nerved, at the base, mucronulate, ½′–1′ long, 3″–5″ wide, the lower usually smaller; peduncles axillary and terminal; cymes numerous, few-flowered; pedicels 1″–6″ long, flowers yellowish purple; fruit densely hispid, nearly 2″ in diameter. [*G. rubrum* of Lefroy?]

Collected somewhere in Bermuda by Baldwin, in the year 1815 as appears from specimens preserved in the herbarium of the Academy of Natural Sciences of Philadelphia, but not certainly found here by others. Presumably native. Eastern United States. Barren specimens of a *Galium* found along the South Shore Road, near Camden, in 1914, may be this species.

3. Galium bermudénse L. BERMUDA BEDSTRAW. HEAL-SOON. (Fig. 402.) Perennial, much branched, hirsute, hispid or nearly glabrous, 6′–2° high. Leaves in 4's, 1-nerved, oval, mucronate, rather thick, 3″–10″ long, 1½″–4″ wide, the margins more or less revolute in drying; flowers few, terminating the branchlets, white; pedicels 3″–4″ long, rather stout, becoming deflexed in fruit; fruit fleshy, minutely pubescent, about 2″ broad. [*G. hispidulum* Michx.; *G. uniflorum* of Lefroy, of Hemsley and of H. B. Small; *G. hypocarpium* of Reade; *Relbunium hypocarpium* of Moore.]



Common on hillsides. Native. Southeastern United States and Bahamas. Flowers from spring to autumn. Its seed presumably transported to Bermuda by a bird.

The plant is first recorded by Plunkenet, in his "Almagestum Botanicum" on page 324, and illustrated on his *plate 248, figure 6*, as "Rubia tetraphyllos glabra, latiore folio, bermudensis, seminibus binis atropurpureis" he received it from Dr. Petiver.

10. **SHERÁRDIA** [Dill.] L.

Slender annual procumbent or diffuse herbs, with verticillate spiny-pointed leaves, and small nearly sessile pink or blue flowers, in involucrate heads. Calyx-tube ovoid, its limb 4–6-lobed, the lobes lanceolate, persistent. Corolla

funnelform, 4–5-lobed, the tube as long as the lobes or longer. Stamens 4 or 5, inserted on the tube of the corolla; filaments slender; anthers linear-oblong, exserted. Ovary 2-celled; style 2-cleft at the summit; ovules 1 in each cavity. Fruit didymous, the carpels indehiscent. Seed erect. [Named for Dr. Wm. Sherard, 1659–1728, patron of Dillenius.] A monotypic genus.

1. Sherardia arvénsis L. Blue Field-Madder. Herb Sherard. Spur-wort. (Fig. 403.) Tufted, roughish; stems numerous, prostrate, ascending, or decumbent, 2½′–10′ long. Leaves in 4's, 5's or 6's, the upper linear or lanceolate, acute and sharp-pointed, rough-ciliate on the margins, 3″–8″ long, 1″–2″ wide, the lower often obovate, mucronate; flowers in slender-peduncled involucrate heads, the involucre deeply 6–8-lobed, the lobes lanceolate, sharp-pointed; corolla-lobes spreading; fruit crowned with the 4–6 lanceolate calyx-teeth. [*Galium arvensis* of H. B. Small.]



Roadsides, lawns and waste grounds. Occasional. Naturalized. Native of Europe. Introduced into the eastern United States. Flowers in spring and summer.

Rachicallis rupéstris (Sw.) DC., West Indian, a low shrub of rocky coasts, 3° high or less, with densely leafy and thickened twigs, the linear-oblong, fleshy leaves only 3″–5″ long, sharp-pointed, grooved on the back, the solitary and sessile yellow flowers about 3″ long, the salverform corolla 4-lobed, the fruit capsular, is recorded as Bermudian by Jones, Reade, Verrill, Hemsley and by H. B. Small. Reade's description of the plant he saw points to *Randia aculeata*, which he did not record, except in that he says the flowers are yellow, whereas they are white. H. B. Small essentially copied Reade's description, and both assign the plant to the South Shores. Hemsley cites Munro as a collector of the species, but no specimen of it from Bermuda is preserved either at Kew or at the British Museum of Natural History. Recent collectors have been unable to find it.

Morinda Royoc L., of Florida and the West Indies, was entered as Bermudian in the manuscript list of plants compiled by Lane in 1845, and cited by Hemsley. Lefroy mentions it as a native plant, found in the Walsingham tract, but it does not appear that he ever collected it; no Bermuda specimen could be found in the Kew Herbarium in 1910. Verrill records it under the common name "Saw Weed." Repeated search of the region between Castle Harbor and Harrington Sound has failed to show its existence there at present; it may have disappeared, or the records may be erroneous. It is a shrub, sometimes vine-like, with glabrous, opposite oblong leaves 2′–4′ long, the small white to red flowers in dense peduncled heads, the fruit a fleshy syncarp.

Ixora coccínea L., Red Ixora, East Indian, a glabrous shrub 3°–6° high, with oblong to oblanceolate, sessile, often cordate leaves 2′–4′ long, the red or scarlet flowers commonly numerous in terminal clusters, the slender corolla-tube about 2′ long, narrowly cylindric, the widely spreading limb about ¾

borad, with 5 acute lobes, the style a little exserted, is commonly planted in gardens and on lawns.

Ixora macrothýrsa Teijsm. & Binn., DUFFY'S IXORA, also East Indian, a large shrub with glabrous oblong-lanceolate acuminate leaves 8′–12′ long, the crimson flowers in clusters often 8′ broad, the corolla with 5 blunt lobes, was grown at Paget Rectory in 1914. [*I. Duffii* Moore.]

Three other species of East Indian *Ixoras* mentioned by Jones and by Lefroy, were planted at Mt. Langton in 1870 or 1874, *I. javanica* DC., *I. amboynae* DC. and *I. acuminata* Roxb.

Gardenia jasminoïdes Ellis, CAPE JESSAMINE, Chinese, an evergreen shrub becoming 6° high, with elliptic short-petioled, acute or acuminate leaves 2′–4′ long, its fragrant white, often double flowers 2′–3′ broad, is occasionally planted for ornament. [*G. florida* L.; *G. Fortunei* of gardeners.]

A colored picture postal card, purporting to show the Cape Jessamine, bought in 1913, represents *Plumiera rubra*, the Frangipauni. *Tabernaemontana citrifolia* is sometimes erroneously called Cape Jessamine.

Gardenia nítida Hook., was introduced at Mount Langton in 1875, according to Lefroy, but subsequently disappeared.

Rondeletia odoràta Jacq., SCARLET RONDELETIA, West Indian, grown in a few gardens, is a shrub 3°–6° high, with slender pubescent branches, very short-petioled ovate to oblong leaves 1′–3′ long, and scarlet flowers in terminal corymbs, the slender pubescent corolla-tube about ½′ long, the spreading limb about ½′ broad, the small capsules globose.

Hamelia erécta Jacq., SCARLET HAMELIA, West Indian and Floridan, grown for ornament, is a shrub up to 7° high, with thin, ovate to elliptic pointed leaves 3′–6′ long, and scarlet nearly tubular flowers about ¾′ long, in terminal cymes, followed by black berries. [*H. patens* Jacq.]

Vangueria édulis L., EDIBLE VANGUERIA, Madagascan, listed by Jones in 1873 and mentioned by Reade as reported at Mt. Langton prior to 1883, is a low glabrous tree with thin ovate short-petioled leaves about 5′ long and lateral cymes of many small greenish flowers, the corolla with reflexed lobes, the edible succulent fruit about 1′ in diameter, containing 5 stones.

Pentas lanceolàta (Forsk.) K. Schum., tropical African, a somewhat woody herbaceous pubescent perennial about 2° high, with petioled ovate-lanceolate acuminate leaves 2′–4′ long, and purplish flowers in terminal corymbs, the slender corolla about 1½′ long, its limb about one-fourth as long as the tube, was cultivated in the Public Garden prior to 1883, according to Reade. [*Pentas carnea* Benth.]

Palicourea domingénsis (Jacq.) DC., mentioned by H. B. Small as seen by him at Bishop's Lodge, many years ago, is a glabrous West Indian shrub about 6° high, with thin slender-petioled elliptic acuminate leaves, and corymbose white nearly tubular, curved flowers about 1′ long. [*P. Pavetta* DC.; *Psychotria domingensis* Sw.]

Mussaenda frondòsa L., LEAFY MUSSAENDA, of tropical Asia, a shrub, with pubescent twigs, oval to lanceolate, pubescent leaves 4′–6′ long, corymbose terminal yellow flowers, one of the calyx-teeth greatly enlarged into a showy ovate appendage 1′–2′ long, the funnelform corolla with a short 5-cleft limb, is occasionally planted for ornament.

A species of *Hoffmania*, introduced at Mt. Langton in 1875, is said by Lefroy to have established itself where screened from high winds; Lefroy recorded it as *H. splendens* Benth., but there is no such published name, and I am unable to tell what plant he had in mind.

Family 2. **CAPRIFOLIÀCEAE** Vent.

HONEYSUCKLE FAMILY.

Shrubs, trees, vines, or perennial herbs, with opposite leaves and perfect, mostly cymose flowers. Stipules none, or sometimes present. Calyx-tube adnate to the ovary, its limb 3–5-toothed or 3–5-lobed. Corolla gamopetalous, the limb 5-lobed, sometimes 2-lipped. Stamens 5 (rarely 4), inserted on the tube of the corolla and alternate with its lobes; anthers versatile. Ovary inferior, 1–6-celled; style slender; stigma capitate, or 2–5-lobed, the lobes stigmatic at the summit; ovules anatropous. Fruit a 1–6-celled berry, drupe, or capsule. Seeds oblong, globose, or angular; seed-coat membranous or crustaceous, embryo usually small, placed near the hilum; radicle terete; cotyledons ovate. About 10 genera and 300 species, mostly of the northern hemisphere.

Corolla rotate, small, regular; style deeply lobed. 1. *Sambucus*.
Corolla campanulate to tubular, large, often 2-lipped; style slender. 2. *Lonicera*.

1. **SAMBÙCUS** L.

Shrubs or trees (or some species perennial herbs), with opposite pinnate leaves, serrate or laciniate leaflets, and small white or pinkish flowers in compound depressed or thyrsoid cymes. Calyx-tube ovoid or turbinate, 3–5-toothed or 3–5-lobed. Corolla rotate or slightly campanulate, regular, 3–5-lobed. Stamens 5, inserted at the base of the corolla; filaments slender; anthers oblong. Ovary 3–5-celled; style short, 3-parted; ovules 1 in each cavity, pendulous. Drupe berry-like, containing 3–5, 1-seeded nutlets. Endosperm fleshy; embryo nearly as long as the seed. [Latin name of the elder.] About 25 species, of wide geographic distribution. Type species: *Sambucus nigra* L.

1. Sambucus intermédia Carr. WEST INDIAN ELDER. (Fig. 404.) A small tree, 5°–12° high, glabrous, except the brownish-pubescent young foliage. Leaves 1–2-pinnate, 10′ long or less; leaflets rather firm in texture, 5–9, short-stalked, oblong-lanceolate, serrate or serrulate with incurved teeth, 2′–4′ long, acuminate at the apex, narrowed or obtuse at the base; cymes decompound, convex, 8′ broad or less, long-stalked, mostly broader than high; flowers very numerous, white, about 2″ broad; pedicels very slender, 2″–3″ long; fruit described as black. [*S. nigra* of Reade, Jones and Lefroy.]



Waste grounds, occasionally escaped from cultivation. Commonly planted for ornament. Introduced. Flowers in summer and autumn. The flowers mostly fall away without setting fruit in Bermuda.

2. LONÍCERA L.

Erect or climbing shrubs or vines, with opposite mostly entire leaves; flowers spicate, capitate or geminate, usually somewhat irregular. Calyx-tube ovoid or nearly globular, the limb slightly 5-toothed. Corolla often gibbous at the base, the limb 5-lobed, more or less oblique, or 2-lipped. Stamens 5, inserted on the tube of the corolla. Ovary 2–3-celled; ovules numerous, pendulous; style slender, stigma capitate. Berry fleshy, 2–3-celled or rarely 1-celled, few-seeded. Seeds with fleshy endosperm and a terete embryo. [Named for Adam Lonitzer, 1528–1586, a German botanist.] About 160 species, of the north temperate zone, a few in tropical regions. Type species: *Lonicera Caprifolium* L.



1. Lonicera japónica Thumb. JAPANESE OR CHINESE HONEYSUCKLE. (Fig. 405.) A pubescent, climbing or trailing vine, sometimes 15° long or more. Leaves short-petioled, ovate, entire, 1′–3½′ long, acute at the apex, rounded at the base, dark green and glabrous above, pale and usually sparingly pubescent beneath; flowers leafy-bracted at the base, white or pink, fading to yellow, pubescent without, the tube longer than the strongly 2-lipped limb; stamens and style exserted; berries black, 3″–4″ in diameter.

Waste grounds and roadsides, escaped from cultivation. Introduced. Native of eastern Asia. Widely naturalized in the eastern United States. Flowers freely in summer and autumn. Commonly planted for ornament.

Lonicera sempérvirens L., TRUMPET HONEYSUCKLE, North American, a glabrous high climbing vine, with oval or oblong leaves pale beneath, the upper pairs connate-perfoliate, the scarlet to yellow tubular flowers in terminal clusters, with corollas an inch long or more, is planted for ornament on walls and porches. [*Caprifolium sempervirens* Michx.] An elegant vine was seen at Cedar Lodge in 1914.

Lonicera Caprifòlium L., ITALIAN HONEYSUCKLE, European, is a vine with foliage similar to that of the Trumpet Honeysuckle, the upper pairs of leaves connate-perfoliate, but the corolla is purple and strongly 2-lipped, the upper lip 4-lobed, the lower lip narrow and reflexed. [*Caprifolium italicum* Medic.]

Lonicera Xylósteum L., FLY HONEYSUCKLE, European, credited to Bermuda by Jones, is a shrub up to 6° high, with pubescent ovate to obovate leaves, the yellowish-white flowers in pairs on axillary peduncles, followed by scarlet berries.

Viburnum Tinus L., LAURESTINUS, European, planted for ornament, is a shrub 4°–10° high, glabrous or nearly so, with ovate to elliptic, entire acute leaves 2′–4′ long, often ciliate, and terminal cymes of white, slightly odorous flowers, the rotate-campanulate corolla 3″–4″ broad, the nearly black drupes ovoid, about 4″ long.

Abelia serràta Sieb. & Zucc., JAPANESE ABELIA, grown in gardens for ornament, is a shrub about 6° high, which may be trained against walls, with slender branches, ovate short-petioled toothed acute or acuminate leaves about 1′ long, the white flowers in small terminal leafy panicles, the calyx of 4 thin oblong veiny sepals, the funnelform-campanulate corolla 7″–9″ long, longer than the stamens.

Order 8. VALERIANÀLES.

Herbs, the corolla gamopetalous. Stamens mostly fewer than the corolla-lobes; anthers separate. Ovary inferior, 1-celled with 1 pendulous ovule, or 3-celled with 2 of the cavities without ovules.

Ovary 3-celled, 2 cavities empty.	Fam. 1. VALERIANACEAE.
Ovary 1-celled; flowers densely capitate, involucrate.	Fam. 2. DIPSACACEAE.

Family 1. VALERIANÀCEAE Batsch.

VALERIAN FAMILY.

Herbs, with opposite leaves, no stipules, and usually small flowers, in cymes. Calyx-tube adnate to the ovary, its limb inconspicuous or none in flower, often becoming prominent in fruit. Corolla epigynous, somewhat irregular, its tube narrowed, and sometimes gibbous or spurred at the base, its limb spreading, mostly 5-lobed. Stamens 1–4, inserted on the corolla and alternate with its lobes. Ovary inferior, 1–3-celled, one of the cavities containing a single anatropous ovule, the others empty. Fruit indehiscent, dry, containing a single suspended seed. Endosperm little or none; embryo straight; cotyledons oblong. About 9 genera and 300 species, of wide distribution.

Corolla-tube short, not spurred; stamens 3.	1. *Valerianella*.
Corolla-tube long, spurred; stamen 1, rarely 2.	2. *Centranthus*.

1. VALERIANÉLLA Poll.

Annual dichotomously branched herbs, the basal leaves tufted, entire, those of the stem sessile, the flowers in compact or capitate cymes. Corolla small, white, blue, or pink, nearly regular. Calyx-limb short or obsolete in flower, often none. Corolla-tube narrowed at the base, the limb spreading, 5-lobed. Stamens 3. Style minutely 3-lobed at the summit. Fruit 3-celled, 2 of the cells empty, and in our species about as large as the fertile one. [Name a diminutive of Valerian.] About 50 species, of the northern hemisphere, the following typical.



1. Valerianella Locústa (L.) Bettke. EUROPEAN CORN SALAD. (Fig. 406.) Glabrous, or pubescent at the nodes, 6′–12′ high, usually repeatedly forked. Basal leaves spatulate or oblanceolate, rounded and obtuse at the apex, 1′–2′ long, entire; upper stem leaves oblong-lanceolate, usually dentate; peduncles short; cymes 3″–6″ broad, almost capitate; bracts linear or linear-oblong; corolla blue, about 1″ long;. fruit flattened, rounded on the edges, 1″ long, glabrous, depressed-orbicular in outline, the two empty cavities smaller than the fertile one, which has a corky mass at its back. [*V. olitoria* Poll.]

Collected by Lefroy on St. David's Island prior to 1877, as evidenced by specimens subsequently studied by Reade (Plants of Bermuda, p. 38). Introduced. Perhaps cultivated for salad. Native of Europe. Naturalized in the United States. Flowers in spring.

2. CENTRÀNTHUS DC.

Herbs, annual or perennial, the lower leaves mostly dentate, the upper entire, dentate, lobed or pinnatifid, the red or white flowers in terminal compound cymes or panicles. Calyx-limb short at flowering time, developing into plumose or ciliate bristles in fruit. Corolla-tube slender, spurred at or below the middle, the limb spreading, 5-lobed. Stamen 1, rarely 2. Style 2–3-lobed at the apex. Fruit compressed, convex and 1-nerved on one side, concave on the other. [Greek, spur-flower.] About 8 species, natives of the Mediterranean region. Type species: *Centranthus ruber* (L.) DC.



1. Centranthus macrosìphon Boiss. SUGAR PLUM. (Fig. 407.) Glabrous, glaucous, 1°–1½° high, the stem hollow, swollen, the branches ascending. Lower leaves broadly elliptic or obovate-elliptic, coarsely few-toothed, 1½′–2½′ long, obtuse, their petioles about one-half as long as the blades; upper leaves sessile, incised or pinnatifid; bracts linear-lanceolate; cymes 1′–2′ broad, many-flowered; corolla pink or rose, about 7″ long its limb about 2″ broad, its tube spurred near the base; fruit narrowly oblong, 1½″ long.

Occasional in waste grounds and on roadsides. Naturalized. Native of Spain and northern Africa. Flowers in spring.

Centranthus ruber (L.) DC., CENTRANTHUS, European, has the leaves mostly entire, ovate to lanceolate, the rose or white flowers panicled; it is occasionally grown in flower-gardens. [*Valeriana rubra* L.]

Family 2. **DIPSACÀCEAE** Lindl.

TEASEL FAMILY.

Herbs, with opposite or rarely verticillate leaves, and perfect flowers in dense involucrate heads. Stipules none. Flowers borne on an elongated or globose receptacle, bracted and involucellate. Calyx-tube adnate to the ovary, its limb cup-shaped, disk-shaped, or divided into spreading bristles. Corolla epigynous, the limb 2–5-lobed. Stamens 2–4, inserted on the tube of the corolla and alternate with its lobes; filaments distinct; anthers versatile. Ovary inferior, 1-celled; style filiform; stigma undivided, terminal, or oblique and lateral; ovule 1, anatropous. Fruit an achene, its apex crowned with the persistent calyx-lobes. Seed-coat membranous; endosperm fleshy; embryo straight. About 7 genera and 140 species, of the Old World.

1. **SCABIÒSA** [Tourn.] L.

Herbs, with opposite leaves, no prickles, and blue, pink, or white flowers in peduncled involucrate heads. Bracts of the involucre herbaceous. Scales of the receptacle small, capillary, or none. Involucels 2–8-ribbed, the margins 4-toothed or expanded. Calyx-limb 5-toothed. Limb of the corolla 4–5-cleft, oblique or 2-lipped. Stamens 4 (rarely 2). Stigma oblique or lateral. Achene adnate to the involucel, crowned with the persistent calyx. [Latin, scale, from its repute as a remedy for scaly eruptions.] About 75 species, natives of the Old World. Type species. *Scabiosa arvensis* L.

1. Scabiosa nitens R. & S. AZOREAN SCABIOUS. (Fig. 408.) Perennial, nearly glabrous, slender, little branched, about 1° high. Basal and lower leaves spatulate or oblong-spatulate 1½′–2½′ long, obtuse, dentate above the middle, narrowed into ciliate, margined petioles; upper leaves linear, narrower than the basal ones but sometimes longer, sessile or nearly so, acute or acuminate; heads long-peduncled; bracts of the involucre linear, ciliate, acutish, 9″–12″ long; flowers purple, about 6″ long, the corolla pubescent.



Roadside north of Camden Marsh, 1912. Introduced. Native of the Azores. Flowers in summer and autumn.

Scabiosa atropurpùrea L., SWEET SCABIOUS, European, grown in flower-gardens, is annual, with dentate basal and lower leaves, the upper pinnatifid-parted, the bracts of the involucre little, if any, longer than the purple, pink or white flowers. [*S. maritima* L.]

Order 9. CAMPANULÀLES.

Herbs, rarely shrubs, the corolla gamopetalous, or petals sometimes separate in Cucurbitaceae. Stamens as many as the corolla-lobes (fewer in the Cucurbitaceae); anthers united except in *Campanula* and *Specularia* of the Campanulaceae, in Ambrosiaceae, and in *Kuhnia* of the Compositae. Ovary inferior.

Flowers not in involucrate heads; juice mostly milky.	
Endosperm none; flowers regular, monoecious or dioecious; our species vines.	Fam. 1. CUCURBITACEAE.
Endosperm present, fleshy; flowers perfect, irregular.	
Stigma not indusiate.	Fam. 2. LOBELIACEAE.
Stigma indusiate.	Fam. 3. GOODENIACEAE.
Flowers in involucrate heads.	
Flowers all expanded into rays (ligulate); juice milky.	Fam. 4. CICHORIACEAE.
Flowers all tubular, or the outer expanded into rays; juice very rarely milky.	
Stamens distinct, or nearly so.	Fam. 5. AMBROSIACEAE.
Stamens united by their anthers into a tube around the style (except in *Kuhnia*).	Fam. 6. COMPOSITAE.

Family 1. CUCURBITÀCEAE B. Juss.

GOURD FAMILY.

Herbaceous vines, usually with tendrils. Leaves alternate, petioled, generally palmately lobed or dissected. Flowers monoecious or dioecious. Calyx-tube adnate to the ovary, its limb usually 5-lobed, the lobes imbricated. Petals usually 5, inserted on the limb of the calyx, separate, or united into a gamopetalous corolla. Stamens mostly 3 (sometimes 1), 2 of them with 2-celled anthers, the other with a 1-celled anther; filaments short, often somewhat monadelphous. Ovary 1–3-celled; style terminal, simple, or lobed; ovules anatropous. Fruit a pepo, indehiscent, or rarely dehiscent at the summit, or bursting irregularly; or sometimes dry and membranous. Seeds usually flat; endosperm none. About 90 genera and 700 species, mainly of tropical regions.

There are no native nor naturalized species of the family in Bermuda.

Cucurbita Lagenària L., GOURD, of the Old World tropics, is grown for interest and its fruit sometimes cut into utensils.

Cucurbita máxima Duchesne, SQUASH, probably Asiatic in origin, commonly grown for its fruit, has round or reniform, unlobed leaves, monoecious yellow axillary flowers, the fruit various in form.

Cucurbita Pèpo L., PUMPKIN, perhaps tropical American, is one of the most important summer and autumn crops of Bermuda, and is grown in a number of races, the seed sown in late spring, the fruit large and of excellent quality. The vine bears large 2–5-lobed leaves and solitary monoecious yellow flowers in the leaf-axils, the corolla large and bell-shaped. [*C. Melopepo* L.]

Cucurbita moschàta Duchesne, CROOKNECK SQUASH, perhaps East Indian, is recorded by Jones as grown in Bermuda.

Sechium édule (Jacq.) Sw., CHOCHO, CHRISTOPHINE, West Indian, a long vine, with thin suborbicular leaves 5′–10′ broad, cordate and angular-lobed, the tendrils 3–5-cleft, the yellowish staminate flowers in long axilary racemes or narrow panicles with a solitary pistillate flower at the same axil, the muricate or smooth fruit obovoid, 3′–5′ long, is cultivated for its fruit. [*Sicyos edulis* Jacq.]

Citrullus Citrùllus (L.) Karst., WATER MELON, tropical African, extensively grown in several races as a summer and early autumn fruit, has solitary axillary yellow monoecious flowers, the corolla rotate, the staminate flowers with separate anthers. [*Cucurbita Citrullus* L.; *Citrullus vulgaris* Schrad.]

Cucumis Mèlo L., MELON, MUSK-MELON, of southern Asia, of which several races are grown, the fruits various.

Cucumis satìvus L., CUCUMBER, of southern Asia is also an important crop, several kinds being successfully grown.

Sicyos angulàtus L., STAR CUCUMBER, WILD BRYONY, North American, mentioned by Lefroy as of chance introduction about Church Cave, prior to 1879, and also recorded by Hemsley, and by H. B. Small, but not recently observed in Bermuda, is a slender climbing vine, with thin angled leaves and small whitish monoecious flowers, the staminate loosely racemose, the pistillate capitate, these followed by small spiny fruits each with one seed. H. B. Small records having seen a few rare specimens about Hamilton.

Family 2. **LOBELIÀCEAE** Dumort.

LOBELIA FAMILY.

Annual or perennial herbs, or rarely trees, often with a milky sap. Leaves alternate, without stipules, simple. Inflorescence axillary or terminal. Flowers perfect, or rarely dioecious, irregular. Calyx of 5 sepals. Corolla often bilabiate, the tube open on one side nearly or quite to the base. Stamens 5; filaments sometimes cohering into a tube. Ovary 2–5-celled; styles terminal, united; stigmas fringed. Ovules numerous, sessile, horizontal, anatropous. Fruit a 1–several-celled capsule or a berry. Seeds numerous, with a smooth or furrowed testa. Endosperm fleshy. Embryo straight in the axis of the endosperm. About 20 genera and 600 species, of wide geographic distribution.

Lobelia Erìnus L., SMALL BLUE LOBELIA, South African, a low species, about 6′ high, the lower leaves obovate or spatulate, the upper oblong or linear, the slender-stalked blue or purple flowers about ½′ broad, the corolla 2-lipped, is grown in vases and in flower-gardens.

My only knowledge of the existence of any other representative of this family in Bermuda is the record by Lefroy, of the cultivation of the North American Cardinal-flower, *Lobelia cardinalis* L., as a garden flower, and the statement of H. B. Small that it grew in a shaded place. It is a perennial herb with terminal racemes of bright scarlet flowers, and thin, oblong to lanceolate, acute denticulate leaves.

Family 3. **GOODENIÀCEAE** Dumort.

GOODENIA FAMILY.

Herbaceous or shrubby plants, with watery sap. Leaves alternate or sometimes opposite, without stipules, entire, toothed or rarely pinnatifid. Flowers perfect. Calyx 5-toothed, an entire border or sometimes obsolete. Corolla 5-lobed, split on one side. Androecium of 5 distinct stamens, the anthers opening lengthwise. Ovary mostly inferior, 1–2-celled; styles usually united. Stigma surrounded with an indusium. Ovules 1 or 2, or more in each cavity, mostly erect or ascending. Fruit drupaceous, berry-like or capsular. Seeds usually one in each cavity; embryo straight in the axis of the fleshy endosperm. About 12 genera and over 200 species, mostly Australian.

1. SCAEVÒLA L.

Fleshy, stout herbs or shrubs, with alternate or rarely opposite, mostly entire leaves, the flowers irregular, axillary, in dichotomous cymes or rarely solitary. Calyx 5-lobed, or a mere border. Corolla white or blue, its lobes winged, its tube split to the base on one side, villous within. Stamens 5, free, epigynous; filaments distinct. Ovary inferior or nearly so, 2-celled or rarely 1-celled; stigma surrounded by a ciliate indusium. Ovules 1 in each cavity, or 2 in 1-celled ovaries, erect. Berry with a fleshy exocarp and a bony or woody endocarp. [Latin, referring to the irregular flowers.] About 60 species, mostly Australian, the following typical.



1. Scaevola Plumièri (L.) Vahl. BEACH LOBELIA. INKBERRY. (Fig. 409.) Perennial, nearly glabrous, more or less shrubby, 2°–5° high, much branched and straggling. Leaves alternate, obovate, 1½′–3′ long, entire, shining, narrowed into very short winged petioles, or nearly sessile, with a tuft of silky hairs in each axil; peduncles shorter than the leaves; calyx-lobes much broader than long, rounded; corolla glabrous without, about 1′ long, the tube woolly within, split on one side to the base, the lobes oblong-linear, with broad crisped wings; stamens nearly as long as the corolla-tube, hanging through the cleft; berry oval, black, juicy, 2-seeded, 5″–8″ long. [*Lobelia Plumieri* L.; *Scaevola Lobelia* of Verrill.]

Common on sea beaches. Native. Florida and the West Indies. Flowers from spring to autumn. Doubtless reached Bermuda by floating.

Family 4. CICHORIÀCEAE Reichenb.

CHICORY FAMILY.

Herbs (two Pacific Island genera trees), almost always with milky, acrid or bitter juice, alternate or basal leaves, and yellow, rarely pink, blue, purple, or white flowers in involucrate heads (anthodia). Bracts of the involucre in 1 to several series. Receptacle of the head flat or flattish, naked, scaly (paleaceous), smooth, pitted, or honeycombed. Flowers all alike (heads homogamous), perfect. Calyx-tube completely adnate to the ovary, its limb (pappus) of scales, or simple or plumose bristles, or both, or wanting. Corolla gamopetalous, with a short or long tube, and a strap-shaped (ligulate) usually 5-toothed limb (ray). Anthers connate into a tube around the style, the sacs sagittate or auricled at the base, not tailed, usually appendaged at the summit, the simple pollen-grains usually 12-sided. Ovary 1-celled; ovule 1, anatropous; style very slender, 2-cleft, or 2-lobed, the lobes minutely papillose. Fruit an achene. Seed erect; endosperm none; radicle narrower than the cotyledons. About 70 genera and 1500 species, of wide geographic distribution. The family is also known as LIGULIFLORAE.

Pappus none; rays blue or sometimes white.	1. *Cichorium.*
Pappus present; rays yellow.	
Pappus-bristles simple.	
Acaulescent scapose herbs, with solitary flower heads.	2. *Leontodon.*
Leafy-stemmed herbs with several or many flowers.	
Achenes beakless.	
Achenes beaked or pointed.	3. *Crepis.*
Achenes 10-many-ribbed.	4. *Sonchus.*
Achenes 4-5-ribbed.	5. *Reichardia.*
Pappus-bristles plumose.	6. *Urospermum.*

1. CICHÒRIUM [Tourn.] L.

Erect, branching herbs, with alternate and basal leaves, those of the stem and branches usually small and bract-like, and large heads of blue, purple or white flowers, peduncled or in sessile clusters. Involucre of 2 series of herbaceous bracts, the outer somewhat spreading, the inner erect, subtending the outer achenes. Receptacle flat. Rays truncate and 5-toothed at the apex. Anthers sagittate at the base. Style-branches slender, obtusish. Achenes 5-angled or 5-ribbed, truncate, not beaked. Pappus of 2 or 3 series of short blunt scales. [From the Arabic name.] About 8 species, natives of the Old World, the following typical.

1. Cichorium Íntybus L. CHICORY. WILD SUCCORY. BLUE SAILORS. (Fig. 410.) Perennial from a long deep tap-root; stems slightly hispid, stiff, much branched, 1°–3° high. Basal leaves spreading on the ground, runcinate-pinnatifid, spatulate in outline, 3′–6′ long, narrowed into long petioles; upper leaves much smaller, lanceolate or oblong, lobed or entire, clasping and auricled at the base; heads numerous, 1′–1½′ broad, 1–4 together in sessile clusters on the nearly naked or bracted branches; inner bracts of the involucre about 8. The ground-up root is used as a substitute or adulterant for coffee. July–Oct.

Common in waste and cultivated grounds, and along roads. Naturalized. Native of Europe. Widely naturalized in North America. Flowers nearly throughout the year.



2. LEÓNTODON L.

Perennial acaulescent herbs, with basal tufted pinnatifid or sinuate-dentate leaves, and large heads of yellow flowers, solitary, or very rarely 2 or 3 together at the ends of naked hollow scapes. Involucre oblong or campanulate, its inner bracts in 1 series, nearly equal, slightly united at the base, the outer of several series of shorter somewhat spreading ones, often reflexed at maturity. Receptacle flat, naked. Rays truncate and 5-toothed at the summit. Anthers sagittate at the base. Style-branches slender, obtusish. Achenes oblong or linear-fusiform, 4–5-angled, 5–10-nerved, roughened or spinulose, at least above, tapering into a very slender beak. Pappus of numerous filiform unequal simple persistent bristles. [Greek, lion's-tooth.] About 20 species, natives of the northern hemisphere and southern South America, the following typical.



1. Leontodon Taráxacum L. DANDELION. BLOWBALL. (Fig. 411.) Root thick, deep, often 6′–12′ long, bitter. Leaves oblong to spatulate in outline, usually pubescent, at least when young, acute or obtuse, pinnatifid or sinuate-lobed, rather succulent, 2′–10′ long, ½′–2½′ wide, narrowed into petioles; scape erect, 2′–18′ high; head 1′–2′ broad; flowers 150–200; inner bracts of the involucre linear or linear-lanceolate, the outer similar, shorter, not glaucous, reflexed, all acute; achenes greenish-brown. [*Taraxacum officinale* Weber; *T. Dens-leonis* Desf.]

Common in waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized in North America, sparingly in the West Indies. Flowers throughout the year, abundantly in spring.

3. CRÈPIS L.

Herbs, with mostly toothed or pinnatifid leaves, and small or middle-sized heads of yellow or orange flowers. Involucre cylindric, campanulate, or swollen at the base, its principal bracts in 1 series, equal, with exterior smaller ones. Receptacle naked or short-fimbrillate. Rays truncate and toothed. Anthers sagittate. Style-branches slender. Achenes linear-oblong, 10–20-ribbed or nerved, narrowed at the base and apex. Pappus copious, of slender white bristles. [Greek, sandal; application not explained.] About 200 species, of the northern hemisphere. Type species: *Crepis tectorum* L.



1. Crepis japónica (L.) Benth. JAPANESE HAWKSBEARD. (Fig. 412.) A glabrous, slender, fibrous-rooted annual 6′–20′ high. Leaves nearly all basal or near the base, 2′–6′ long, lyrate-pinnatifid, thin, slender-petioled; heads numerous in a narrow elongated panicle, its branches almost filiform; involucre about 3″ long, its principal bracts about 1°, linear-lanceolate, with 4 or 5 short ovate outer ones; rays small, yellow; achenes 1½″ long. [*Prenanthes japonica* L.; recorded by previous authors as *Crepis lyrata* Froel.]

Roadsides, waste and cultivated grounds. Naturalized. Native of eastern Asia. Spring to autumn. Naturalized in Jamaica.

4. SÓNCHUS [Tourn.] L.

Succulent herbs, with alternate, mostly clasping, spinulose-margined leaves, and peduncled, corymbose or paniculate heads of yellow flowers. Involucre ovoid or campanulate, usually becoming thickened at the base when old, its bracts imbricated in several series. Receptacle flat, naked. Anthers sagittate. Achenes oval to linear, 10–20-ribbed, narrowed, truncate. Pappus of very copious soft white simple capillary bristles. [Greek name of the Sow-thistle.] About 45 species, of the Old World. Type species: *Sonchus oleraceus* L.

Auricles of the leaves acute; achenes striate, transversely wrinkled. 1. *S. oleraceus.*
Auricles rounded; achenes ribbed, not transversely wrinkled. 2. *S. asper.*

1. Sonchus oleràceus L. ANNUAL SOW-THISTLE. HARE'S LETTUCE. (Fig. 413.) Annual; stem leafy below, 1°–6° high. Basal and lower leaves petioled, lyrate-pinnatifid, 4′–10′ long, the terminal segment commonly large and triangular, the margins denticulate with mucronate teeth; upper leaves pinnatifid, clasping by an auricled base, the auricles pointed; uppermost leaves often lanceolate and entire; heads pale yellow, about 1′ broad; achenes striate and wrinkled.

Common in waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized in temperate and tropical regions. Spring to autumn.





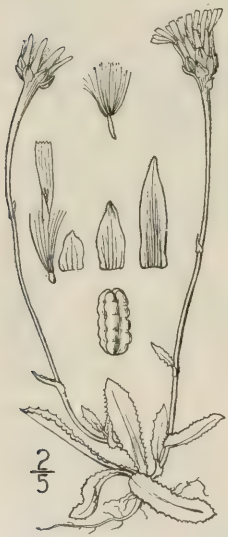
2. Sonchus ásper (L.) All. SPINY OR SHARP-FRINGED SOW-THISTLE. (Fig. 414.) Annual, similar to the preceding species; leaves undivided, lobed or sometimes pinnatifid, spinulose-dentate to spinulose-denticulate, the lower and basal ones obovate or spatulate, petioled, the upper oblong or lanceolate, clasping by an auricled base, the auricles rounded; heads several or numerous, 1′ broad or less; flowers pale yellow; achenes ribbed. [*S. oleraceus asper* L.]

Occasional in waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized in North America. Flowers from spring to autumn.

A slender *Sonchus*, about 1° high, with small, narrow leaves, and few small heads, collected by F. S. Collins on a roadside near Inverary in August, 1913, doubtless of Old World origin, has not been satisfactorily identified.

5. **REICHÁRDIA** Roth.

Glabrous herbs, with basal and alternate, dentate or pinnatifid leaves, and long-peduncled heads of radiate, yellow flowers, the rays 5-toothed and truncate. Involucre campanulate, its bracts imbricated in several series, the inner lanceolate, the outer ovate and much shorter. Receptacle naked. Anthers sagittate. Achenes oblong, nearly terete, 4–5-ribbed and transversely rugose. Pappus of many soft simple white bristles. [In honor of Christian Reichard, 1685–1775, German botanist.] About 10 species, natives of the Old World. Type species: *Reichardia tingitana* (L.) Roth.



1. Reichardia picroides (L.) Roth. REICHARDIA. (Fig. 415.) Annual, subscapose, simple or branched, 6′–15′ high. Basal leaves dentate or pinnatifid, 1½′–4′ long, those of the stems few, distant, very small; involucre about ½′ high, its outer bracts ovate, acute, cordate, scarious-margined, about 2½″ long, the inner lanceolate; rays about ½′ long; achenes of the outer flowers somewhat shorter than those of the inner. [*Scorzonera picroides* L.; *Picridium vulgare* Desf.]

Sand hills near Tucker's Town, 1909. Naturalized. Native of southern Europe. Flowers in spring. The Bermuda specimens are referred to this species, which is described as polymorphous, with some hesitation.

6. **UROSPÉRMUM** Scop.

Little-branched, pubescent or hispid herbs, with basal or alternate, toothed or pinnatifid leaves, and large, long-peduncled heads of yellow radiate flowers. Involucre campanulate, its 7 or 8, acute bracts in a single series. Receptacle naked, conic. Rays truncate, 5-toothed. Anthers sagittate. Achenes nearly terete, linear-oblong, sometimes curved, 8–10-ribbed, muricate, long-beaked. Pappus of 2 series of soft plumose bristles, connate at the base and deciduous. [Greek, tailed-seed.] Two known species, natives of the Mediterranean region, the following typical.

1. Urospermum picroides (L.) F. W. Schmidt. UROSPERMUM. (Fig. 416.) Annual, more or less hispid, simple or branched, 6′–18′ high. Basal and lower leaves spatulate or oblong, petioled, toothed or runcinate, 2′–4′ long; upper leaves lanceolate, sessile, clasping, mostly sagittate, toothed or entire, smaller, acute or acuminate; heads about 1½′ broad, solitary at the ends of hollow peduncles 3′–6′ long; bracts of the involucre lanceolate, acuminate, 8″–10″ long; achenes fusiform, curved, including the subulate beak 8″–10″ long; pappus bright white. [*Tragopogon picroides* L.]

Abundant in fields and on hillsides, eastern part of St. David's Island, 1909. Naturalized. Native of southern Europe. Flowers in spring.



Lactuca sativa L., LETTUCE, European, is grown successfully as a garden vegetable in several races; its flowering stems are 2°–3° high, leafy, the obovate or elliptic leaves obtuse and irregularly toothed, the small numerous yellow-flowered heads borne in terminal panicles.

Tragopogan porrifolius L., SALSIFY, OYSTER-PLANT, European, also grown as a vegetable, is a tall herb, with long narrow leaves, and large heads of purple flowers on thickened peduncles, the bracts of the involucre much longer than the rays.

Family 5. **AMBROSIÀCEAE** Reichenb.

RAGWEED FAMILY.

Herbs, monoecious, or sometimes dioecious, many of them weeds, rarely shrubby, with alternate leaves, or the lower opposite, and small heads of greenish or white flowers subtended by an involucre of few, separate or united bracts, the pistillate heads sometimes larger and nut-like or bur-like. Staminate and pistillate flowers in the same, or in separate heads. Receptacle chaffy. Pistillate flowers with no corolla, or this reduced to a short tube or ring; calyx adnate to the 1-celled ovary, its limb none, or a mere border; style 2-cleft. Staminate flowers with a funnelform tubular or obconic 4–5-lobed corolla; stamens mostly 5, separate, or their anthers merely connivent, not truly syngenesious, with short inflexed appendages; ovary rudimentary; summit of the style often hairy or penicillate. Eight genera and about 60 species, mostly natives of America.

Fruit large, bur-like; leaves broad, lobed. 1. *Xanthium*
Fruit small, tubercled; leaves deeply lobed or pinnatifid. 2. *Ambrosia*

1. XÁNTHIUM [Tourn.] L.

Annual coarse monoecious herbs, with alternate lobed or toothed leaves, and rather small heads of greenish flowers, the staminate heads clustered, terminal, the pistillate solitary or clustered in the upper axils. Involucre of the pistillate heads closed, 1–2-celled, 1–2-beaked, (usually 2-beaked) armed with prickles, forming a bur in fruit; pistillate flowers without a corolla, the style deeply 2-cleft, stamens none; achenes obovoid or oblong without pappus. Involucre of the staminate heads short, of 1–3 series of bracts; staminate corollas regular, 5-toothed; filaments monadelphous; style undivided. [Greek, yellow, from its yielding a yellow dye.] About 25 species of wide geographic distribution. Type species: *Xanthium strumarium* L.



1. Xanthium longiróstre Wallr. WEST INDIAN COCKLEBUR. (Fig. 417.) Stout, 3° high or less, the angular stem hispidulous. Leaves orbicular-ovate, 4′–6′ long, thin, scabrous on both sides, usually 5-lobed, dentate, the lobes short, the base cordate, the petioles 6′ long or less; heads short-racemose; bracts linear-lanceolate, hispid; bur ellipsoid, its body 8″–10″ long, about 4″ thick, glandular-puberulent, rather densely covered with slender bristles about 2″ long, which are hispidulous at the base, its beaks 2″–3″ long, slightly incurved, hispidulous. [*X. echinatum* of Lefroy and of H. B. Small.]

Frequent in waste places. Naturalized. Native of the West Indies and Central America.

2. AMBRÒSIA [Tourn.] L.

Monoecious (rarely dioecious) branching herbs, with alternate or opposite, mostly lobed or divided leaves, and small heads of green flowers, the staminate spicate or racemose, the pistillate solitary or clustered in the upper axils. Involucre of the pistillate heads globose, ovoid or top-shaped, closed, 1-flowered, usually armed with 4–8 tubercles or spines; corolla none; stamens none; style-branches filiform; achenes ovoid or obovoid; pappus none. Involucre of the staminate heads mostly hemispheric or saucer-shaped, 5–12-lobed, open, many-flowered; receptacle nearly flat, naked, or with filiform chaff; corolla funnelform, 5-toothed; anthers scarcely coherent, mucronate-tipped; style undivided, penicillate at the summit. [The ancient classical name.] About 15 species, mostly natives of America. Type species: *Ambrosia maritima* L.

1. Ambrosia elàtior L. RAGWEED. ROMAN WORMWOOD. HOGWEED. WILD TANSY (Fig. 418.) Annual, pubescent, puberulent or hirsute, paniculately branched, 1°–5° high. Leaves thin, 1–2-pinnatifid, petioled, 2′–4′ long, the upper alternate, the lower mostly opposite, pale or canescent beneath, the lobes oblong or lanceolate, obtuse or acute; racemes of sterile heads very numerous, 1′–6′ long, the involucres hemispheric, crenate; fertile heads obovoid or subglobose, mostly clustered, about 2″ long, short-beaked, 4–6-spined near the summit, sparingly pubescent. [*A. artemisiaefolia* L.; *A. heterophylla* of Jones and of Lefroy.]

Common in waste and cultivated grounds. Naturalized. Native of North America. Flowers in summer and autumn.



Family 6. **CARDUÀCEAE** Neck.

THISTLE FAMILY.

Herbs, rarely shrubs (some tropical forms trees), with watery or resinous (rarely milky) sap, and estipulate leaves. Flowers perfect, pistillate, or neutral, or sometimes monoecious or dioecious, borne on a common receptacle, forming heads, subtended by an involucre of bracts arranged in one or more series. Receptacle naked, or with chaffy scales subtending the flowers, smooth, or variously pitted or honeycombed. Calyx-tube completely adnate to the ovary, the limb (pappus) of bristles, awns, teeth, scales, or crown-like, or cup-like, or wanting. Corolla tubular, usually 5-lobed or 5-cleft, the lobes valvate, or that of the marginal flowers of the head expanded into a ligule (ray); when the ray-flowers are absent the head is said to be discoid; when present, radiate; the tubular flowers form the disk. Stamens usually 5, borne on the corolla and alternate with its lobes, their anthers united into a tube (syngenesious), often appendaged at the apex, sometimes sagittate or tailed at the base; pollen grains globose, often rough or prickly. Ovary 1-celled; ovule 1, anatropous; style of fertile flowers 2-cleft; stigmas marginal; style of sterile flowers commonly undivided. Fruit an achene. Seed erect; endosperm none; embryo straight; hypocotyl inferior. About 800 genera and not less than 10,000 species, of wide geographic distribution. In *Kuhnia*, the anthers are distinct, or nearly so.

A. Flowers all tubular, the heads discoid. (See *Emilia, Senecio vulgaris* and *Bidens pilosa.*)
  Anthers not tailed at the base.
    Flowers perfect. 1. *Eupatorium.*
    Flowers dioecious. 2. *Baccharis.*
  Anthers tailed at the base.
    Bracts of the involucre not scarious. 3. *Pluchea.*
    Bracts of the involucre scarious. 4. *Gnaphalium.*

B. Flowers both tubular and radiate (except *Emilia, Senecio vulgaris* and sometimes *Bidens pilosa*).
  1. Receptacle naked. (See *Chrysanthemum.*)
    Bracts of the involucre imbricated in 2-several series.
      Rays yellow. 5. *Solidago.*
      Rays white.
        Bracts imbricated in several series. 6. *Aster.*
        Bracts imbricated in few series.
          Rays longer than the diameter of the disk; heads few. 7. *Erigeron.*
          Rays shorter than the diameter of the disk; heads many, panicled. 8. *Leptilon.*
    Bracts of the involucre in one series, sometimes with a few, short outer ones.
      Style-branches unappendaged. 9. *Senecio.*
      Style-branches appendaged. 10. *Emilia.*
  2. Receptacle chaffy or scaly (except in *Chrysanthemum*).
    Bracts of the involucre not scarious.
      Disk-flowers perfect, but sterile.
        Achenes thick, not flattened. 11. *Polymnia.*
        Achenes flattened. 12. *Parthenium.*
      Disk-flowers fertile.
        Pappus cup-like or of a few teeth or bristles.
          Achenes not flattened.
            Scales of the receptacle awn-like. 13. *Verbesina.*
            Scales of the receptacle broad.
              Low, fleshy, coastal or salt marsh shrubs. 14. *Borrichia.*
              Tall herbs, not fleshy. 15. *Helianthus.*
          Achenes very flat, 2-6-awned. 16. *Bidens.*
        Pappus of numerous scales. 17. *Galinsoga.*
    Bracts of the involucre scarious.
      Receptacle chaffy.
        Achenes flattened; heads small. 18. *Achillea.*
        Achenes terete; heads large. 19. *Anthemis.*
      Receptacle naked. 20. *Chrysanthemum.*

1. **EUPATÒRIUM** [Tourn.] L.

Erect perennial herbs, with opposite or verticillate, or sometimes alternate, often punctate leaves, and in our species cymose-paniculate discoid heads of perfect white or greenish flowers. Involucre oblong, ovoid, campanulate, or hemispheric, the bracts imbricated in 2–several series. Receptacle naked. Corolla regular, its tube slender, its limb 5-lobed or 5-toothed. Anthers obtuse and entire at the base, appendiculate at the apex. Style-branches elongated, flattened, or thickened above, stigmatic at the base. Achenes 5-angled, truncate. Pappus of numerous capillary usually scabrous bristles arranged in 1 row. [Named for Mithridates *Eupator, i. e.*, of a noble father.] Over 500 species, mostly of warm or tropical regions. Type species: *Eupatorium cannabinum* L.

Leaves dissected into filiform segments. 1. *E. capillifolium.*
Leaves oblong to ovate, dentate or serrate.
  Leaves broadly triangular-ovate. 2. *E. adenophorum.*
  Leaves oblong to oblong-lanceolate. 3. *E. riparium.*

1. Eupatorium capillifòlium (Lam.) Small. DOG-FENNEL. FRENCH FENNEL. (Fig. 419.) Erect, paniculately much branched, the stem finely pubescent, 3°–9° high. Leaves crowded, glabrous or nearly so, alternate, the lower petioled, the upper sessile; heads very numerous, about 1½″ high, short-peduncled, racemose-paniculate, 3–6-flowered; bracts of the involucre in about 2 series, linear, cuspidate, narrowly scarious-margined, glabrous. [*Artemisia capillifolia* Lam.; *Eupatorium foeniculaceum* Willd.; *Artemisia tenuifolia* of Lefroy and H. B. Small.]

Waste and cultivated grounds. Naturalized. Native of the southern United States and West Indies. Summer and autumn.



2. Eupatorium adenóphorum Spreng. GLANDULAR EUPATORIUM. (Fig. 420.) Erect, often diffusely branched, 3° high or less, rather densely glandular-pubescent above. Leaves broadly triangular-ovate, 2′–6′ long, 3-nerved and pinnately veined, crenate-dentate, acute or short-acuminate at the apex, obtuse or broadly cuneate at the base, the slender petioles sometimes nearly as long as the blades; heads numerous, many-flowered, densely corymbose; involucre about 2″ high, its bracts in about 3 series, linear-lanceolate, acute or acuminate, the outer ones pubescent. [*E. glandulosum* H.B.K.]

Roadside, St. Georges, 1908. Introduced. Native of Mexico. Flowers in spring. Naturalized in Jamaica. Grown for ornament.



3. Eupatorium ripàrium Regel. SMALL WHITE EUPATORIUM. (Fig. 421.) Stem slender, often widely branched, puberulent above, 1½°–2½° high, the branches slender. Leaves slender-petioled, oblong or oblong-lanceolate, thin, triplinerved, sharply serrate, 2′–4′ long, ½′–1′ wide, acuminate at the apex, narrowed at the base; heads numerous in terminal corymbs, several-flowered, filiform-peduncled; involucre about 2″ high, its bracts in 2 series, linear, the outer pubescent.

Roadside, Paget, 1911, apparently escaped from cultivation. Native of South America. Naturalized in the mountains of Jamaica. Flowers in winter and spring.



Eupatorium odoràtum L., Bushy Thoroughwort, listed as Bermudian by Lefroy and cited by Hemsley, but not by other authors, has not been found here by recent collectors. It is a widely distributed plant of tropical America, reaching southern Florida, perennial, much branched, 3°–6° high, with ovate to lanceolate toothed leaves 2′–4′ long, and many small cylindric heads of whitish or purple flowers, the 3-nerved involucre-bracts imbricated in several series. [*E. conyzoides* Vahl.]

Eupatorium macrophýllum L., Large-leaved Thoroughwort, West Indian, is recorded by Hemsley as preserved in the Sloane Herbarium at the British Museum of Natural History, as from Bermuda (Journ. Bot. 21: 257, 258), but I am not satisfied with the evidence adduced that the specimen he based his determination upon was really collected here. It is a West Indian species of wet regions, with large flaccid ovate petioled leaves and numerous small heads of white flowers.

2. BÁCCHARIS L.

Dioecious shrubs, with alternate leaves, and small paniculate or corymbose heads of tubular flowers. Involucre campanulate in our species, its bracts imbricated in several series, the outer shorter. Receptacle flat, naked, commonly foveolate. Corolla of the pistillate flowers slender, that of the staminate tubular, 5-lobed. Anthers obtuse and entire at the base. Style-branches narrow or subulate, those of the fertile flowers smooth, exserted, those of the sterile flowers rudimentary, tipped with an ovate pubescent appendage. Achenes more or less compressed, ribbed. Pappus of the fertile flowers copious, capillary, that of the sterile flowers short. [Named for Bacchus; originally applied to some different shrubs.] About 300 species, all American, most abundant in South America. Type species: *Bacchus ivifolia* L.



1. Baccharis glomeruliflòra Pers. Doc-bush. (Fig. 422.) A branching shrub 3°–10° tall. Leaves leathery, spatulate to cuneate-obovate, ¾′–1′ long, entire, or sharply toothed above the middle; heads solitary and sessile in the upper axils or few in sessile or short-peduncled clusters; staminate involucres campanulate, 2″ high, with ovate to oblong-ovate obtuse bracts; pistillate involucres ovoid, 2½″–3″ high, with ovate to oblong obtuse bracts; pappus bright white, barely twice as long as the involucre; achenes nearly 1″ long. [*B. heterophylla* of Rein, Reade, Lefroy, Coulter, H. B. Small and Harshberger; *B. halimifolia* of Millspaugh.]

Common in marshes; occasional on hillsides. Native. Southeastern United States. Flowers in late autumn and winter. The abundant white pappus of the fertile bushes make this one of the most conspicuous and attractive plants toward the close of the year. Its fruit was, doubtless, transported to Bermuda on the wind.

3. PLÙCHEA Cass.

Pubescent or glabrous herbs, some species shrubby, with alternate dentate leaves, and small heads of tubular flowers in terminal corymbose cymes. In-

volucre ovoid, campanulate, or nearly hemispheric, its bracts appressed, herbaceous, imbricated in several series. Receptacle flat, naked. Outer flowers of the head pistillate, their corollas filiform, 3-cleft or dentate at the apex. Central flowers perfect, but mainly sterile, their corollas 5-cleft. Anthers sagittate at the base, the auricles caudate. Style of the perfect flowers 2-cleft or undivided. Achenes 4–5-angled. Pappus a single series of capillary scabrous bristles. [Named for the Abbé N. A. Pluche, of Paris.] About 35 species, widely distributed in warm and temperate regions. Type species: *Conyza maritandica* Michx.

Perennial; shrubby; leaves entire. 1. *P. odorata.*
Annual; herbaceous; leaves crenate. 2. *P. purpurascens.*

1. Pluchea odoràta Cass. SHRUBBY FLEABANE. (Fig. 423.) Perennial, closely pubescent. Stems 3°–8° tall, woody. Leaves oblong or nearly so, 3′–6′ long, obtuse or apiculate, entire, petioled; heads numerous, in rounded corymbs; involucre about 1″ high, its bracts oblong or slightly broadened upward, pubescent, ciliate, obtuse. [*Conyza odorata* L.]

Hillsides and thickets. Native. Florida and tropical America. Flowers from spring to autumn. Its achenes probably reached Bermuda on the wind.





2. Pluchea purpuráscens (Sw.) DC. SALT MARSH FLEABANE. (Fig. 424.) Annual, finely pubescent and somewhat glandular. Stems 1°–4° tall, branching above; leaves ovate-lanceolate to elliptic or oblong, 1½′–4′ long, rather blunt, coarsely crenate, short-petioled; heads few or numerous; involucre about 2″ high; bracts oblong to narrowly linear-lanceolate, ciliolate, the outer mucronate, the inner acute or acuminate; flowers purple; corollas of the pistillate flowers about 1½″ long. [*Conyza purpurascens* Sw.; *P. camphorata* of Reade, Hemsley, Verrill and Moore.]

Common in marshes. Native Southern United States and West Indies. Its achenes probably reached Bermuda on the wind. Flowers from spring to autumn.

4. GNAPHALIUM L.

Woolly branched herbs, with alternate leaves, and discoid heads of pistillate and perfect flowers arranged in corymbs, spikes, racemes, or heads. Receptacle flat, convex or conic, not chaffy, usualy foveolate. Pistillate flowers in several series, their corollas filiform, minutely dentate or 3–4-lobed. Central flowers perfect, tubular, few, their corollas 5-toothed or 5-lobed. Anthers sagittate at the base, the auricles tailed. Achenes oblong or obovate, terete or slightly compressed, not ribbed. Pappus a single series of capillary bristles, sometimes thickened above, cohering at the base, or separately deciduous. [Greek, referring to the wool.] About 120 species, widely distributed. Type species: *Gnaphalium luteoalbum* L.



1. Gnaphalium purpùreum L. PURPLISH CUDWEED. (Fig. 425.) Annual or biennial, simple and erect, or branched from the base and the branches ascending, 3′–2° high. Leaves spatulate, or the uppermost linear, mostly obtuse, mucronulate, woolly beneath, usually green and glabrous or nearly so above when old, sessile, or the lowest narrowed into petioles, 1′–2′ long, 2″–3″ wide; heads about 2″ high; bracts of the involucre yellowish brown or purplish, lanceolate-oblong, acute or acutish, the outer woolly at the base; achenes roughish. [*G. luteoalbum* of Reade.]

Occasional in sandy soil. Native. Distribution: Continental North America, Jamaica. Flowers in spring. Its fruit was presumably brought to Bermuda on the wind.

5. SOLIDÀGO L.

Perennial erect herbs, sometimes woody at the base, simple, or little branched, with alternate simple, toothed or entire leaves, and small heads of both tubular and radiate yellow or rarely white flowers, in terminal or axillary panicles, thyrsi, or cymose-corymbose or capitate clusters. Involucre oblong or narrowly campanulate, its bracts imbricated in several series, the outer successively shorter. Receptacle small, flat, or somewhat convex, generally alveolate. Ray-flowers in one series, pistillate. Disk-flowers mostly all perfect, their corollas tubular or narrowly campanulate, 5-cleft or 5-lobed. Anthers obtuse and entire at the base. Style-branches flattened, their appendages lanceolate. Achenes terete or angled, usually ribbed. Pappus of numerous capillary rough nearly equal bristles in 1 or 2 series. [Greek, to make whole.] About 125 species, mostly of North America, several in Europe, a few in Mexico and South America. Type species: *Solidago Virga-aurea* L.

1. Solidago sempérvirens L. Sea-side Goldenrod. Salt-marsh Goldenrod. (Fig. 426.) Stem stout, leafy, usually simple, 1°–6° high, glabrous, or slightly puberulent above. Leaves with 2–5 pairs of lateral veins, the lower and basal ones mostly obtuse, sometimes 1° long, narrowed into long petioles; upper leaves sessile, lanceolate to oblong-lanceolate, acute; heads 3″–5″ high; rays 8–10, showy; bracts of the involucre lanceolate, acute. [*S. virgata* of Lefroy; *S. mexicana* of Lefroy and of H. B. Small.]

Common in nearly all situations, flowering most abundantly in late summer and early autumn, when it is one of the most conspicuous plants. Native. Coast of the eastern United States. The plant varies in size, but there is, apparently, only one species in Bermuda.



6. ÁSTER L.

Perennial or rarely annual, mostly branching herbs, with alternate leaves, and corymbose or paniculate (rarely racemose or solitary) heads of both tubular and radiate flowers. Involucre hemispheric, campanulate or turbinate, its bracts various, imbricated in several series, the exterior ones usually smaller and shorter. Receptacle generally foveolate. Ray-flowers white, pink, purple, blue or violet, pistillate. Disk-flowers tubular, perfect. Anthers obtuse and entire at the base. Style-branches flattened. Pappus-bristles slender, numerous. Achenes flattened and nerved. [Greek, star.] About 250 species, most abundant in North America. Type species: *Aster Amellus* L.



1. Aster squamàtus (Spreng.) Hieron. Scale-leaved Aster. (Fig. 427.) Glabrous, slender, branched, erect, 1°–2½° high. Stem-leaves linear-lanceolate, entire, 1′–1½′ long, 1″–2½″ wide, short-petioled or sessile, acute, somewhat fleshy; leaves of the branches much smaller, scattered, most of them reduced to subulate scales; heads numerous or several, solitary at the ends of short branches; involucre about 3″ high, its linear acute bracts in about 3 series; rays several, pink, about 1″ long. [*Aster Tripolium* of Jones; *Aster tripolium* (misprint for *Tripolium*) of Lefroy.]

Roadsides and waste grounds, Ireland Island, Boaz Island and near Fairy Land. Naturalized. Native of South America. Summer and autumn.

Aster laèvis L., Smooth Aster, North American, glabrous, with stout leafy stems up to 3° high, the leaves sessile, lanceolate to oblanceolate, thick, smooth, entire or somewhat toothed, cordate-clasping at the base, the numerous heads with an involucre of acute green-tipped bracts about 4″ long, the blue or violet rays 6″–12″ long, is occasionally planted in flower-gardens.

Aster cordifòlius L., Blue Wood Aster, North American, seen at Dunbarton in 1914, is 2°–4° high, glabrous, or nearly so, with slender-petioled, ovate cordate serrate pointed thin leaves 2′–5′ long, and small heads, the rays violet or blue, 3″–5″ long.

7. ERÍGERON L.

Branching or scapose herbs, with alternate or basal leaves, and corymbose, paniculate or solitary, peduncled heads, of both tubular and radiate (rarely all tubular) flowers. Involucre hemispheric or campanulate, its bracts narrow, nearly equal, imbricated in but 1 or 2 series in our species. Receptacle nearly flat, usually naked. Ray-flowers, in our species, white, violet or purple, pistillate. Disk-flowers yellow, tubular, perfect, their corollas mostly 5-lobed. Anthers obtuse and entire at the base. Style-branches more or less flattened, their appendages short, mostly rounded or obtuse. Achenes flattened, usually 2-nerved. Pappus-bristles fragile, slender, scabrous or denticulate, in 1 series, or often an additional outer shorter series. [Greek, early-old, alluding to the early hoary pappus.] A genus of some 130 species, of wide distribution. Type species: *Erigeron acris* L.

Herbaceous species.
  Annual; stem leafy. 1. *E. annuus.*
  Perennial; basal leaves tufted, the upper very small. 2. *E. philadelphicus.*
Shrubby species. 3. *E. Darrellianus.*



1. Erigeron ánnuus (L.) Pers. Sweet Scabious. Daisy Fleabane. (Fig. 428.) Annual, sparingly pubescent with spreading hairs; stem erect, corymbosely branched. Leaves thin, the lower and basal ones ovate or ovate-lanceolate, mostly obtuse, petioled, usually coarsely dentate, 2′–6′ long, ¾′–2½′ wide, the upper sessile or short-petioled, lanceolate, oblong, or linear-lanceolate; heads rather numerous, 5″–7″ broad; bracts somewhat hispid; rays 40–70, linear, white, or commonly tinged with purple, 2″–4″ long; pappus double, the inner a series of slender fragile deciduous bristles, often wanting in the ray-flowers, the outer a persistent series of short, partly united, slender scales. [*Aster annuus* L.; *Stenactis annua* Cass.]

Local in fields, waste and cultivated grounds. Naturalized. Native of North America. Flowers from spring to autumn.



2. Erigeron philadélphicus L. PHILADELPHIA FLEABANE. (Fig. 429.) Perennial by stolons and offsets, soft-pubescent or sometimes nearly glabrous; stems slender, mostly branched above, 1°–3° high. Basal and lower leaves spatulate or obovate, obtuse, dentate, ¾′–2½′ long, narrowed into short petioles; upper stem-leaves clasping and often cordate at the base; heads several or numerous, corymbose-paniculate, 5″–12″ broad, slender-peduncled; bracts linear, usually scarious-margined; achenes puberulent. [*E. jamaicensis?* of Reade and of H. B. Small; *E. quercifolium* of Lefroy; *?E. tenuis* of Hemsley.]

Banks and grassy places. Native. Widely distributed in North America. Its fruit probably reached Bermuda on the wind. Flowers in spring and sometimes again in the autumn.

3. Erigeron Darrellianus Hemsley. DARRELL'S FLEABANE. (Fig. 430). Perennial, shrubby, 1°–4½° high, branched, the stem and branches glabrous or pubescent. Leaves thin, oblong or oblanceolate, glabrous, pubescent or ciliate, the lower ones clustered, 3′–5′ long, crenate-dentate with apiculate teeth, or entire, obtuse or acute at the apex, narrowed at the base into short petioles, the upper ones scattered, sessile, much smaller, acute, entire; heads numerous, corymbose paniculate; bracts of the inflorescence linear 1″–2″ long; involucre campanulate-cylindric, about 2″ high, its bracts linear-lanceolate, membranous, acuminate, imbricated in about 3 series, the inner scarious-margined, much longer than the outer; rays about 30, linear, white spreading, about 1½″ long; receptacle pitted; achenes linear, sparingly pubescent, about 1″ long; pappus whitish, 2–3-times as long as the achene; disk-flowers with a narrow, 5-lobed corolla.



Common in rocky situations. Endemic. Flowers from spring to autumn.

This interesting and rather abundant plant, with pretty white flowers, remained botanically unnamed, until published in 1883 by Hemsley in the Journal of Botany **21**: 104, and in the Botanical Report of the Voyage of the Challenger, 1: 42, published in 1885. Lefroy records it as an unidentified *Erigeron*, and Reade in 1883 describes it as an *Aster*, without specific name. I agree with Mr. Hemsley in regarding it as an *Erigeron* though it appears to have its nearest relative in the plant known as *Aster foliatus* Klatt, native of Central America. Several young

plants three or four inches high, taken to the New York Botanical Garden in the late autumn of 1912, grew rapidly and flowered profusely in April, 1913. The species was named in honor of Hon. J. K. Darrell, a prominent member of an old Bermuda family. Mr. Hemsley remarks on the similarity of this plant to *Conyza rivularis* Gardn., of Brazil.

8. LÉPTILON Raf.

Annual or biennial herbs, with small racemose thyrsoid or panicled heads of white flowers, the rays small, usually shorter than the diameter of the disk or none. Involucre mostly campanulate, its narrow bracts in 2 or 3 series. Receptacle naked. Ray-flowers pistillate; disk-flowers perfect, their corollas usually 4-lobed or 4-toothed, the anthers obtuse at the base; style-branches somewhat flattened. Achenes flattened. Pappus of numerous simple bristles. [Greek, referring to the small heads.] About 20 species, of America and Asia. Type species: *Erigeron divaricatum* Michx.

Inner involucre-bracts densely pubescent. 1. *L. linifolium.*
Inner involucre-bracts glabrous or nearly so.
  Pubescent; involucre-bracts green. 2. *L. canadense.*
  Glabrate; bracts purple-tipped. 3. *L. pusillum.*



1. Leptilon linifòlium (Willd.) J. K. Small. HAIRY HORSE-WEED. (Fig. 431.) Stems 6′–3° tall, hirsute, racemosely or paniculately branched above. Leaves narrowly spatulate to linear, ½′–4′ long, the lower ones incised or laciniate, slender-petioled, the upper entire or sparingly toothed; involucres 1″–1½″ high, the bracts linear to linear-subulate, densely pubescent. [*Erigeron linifolium* Willd.; *E. bonariensis* of Reade, of Lefroy and of H. B. Small; *Conyza ambigua* of Millspaugh.]

Common in waste and cultivated grounds. Naturalized. Native of tropical regions. Flowers from spring to autumn. Perhaps not distinct from *Erigeron bonariensis* L.



2. Leptilon canadénse (L.) Britton. HORSEWEED. FLEABANE. (Fig. 432.) Stems hirsute, 1°–6° tall, simple to the paniculate inflorescence; leaves linear or nearly so, or the lower spatulate, coarsely few-toothed, ciliate; heads numerous; involucres about 1½″ high; bracts appressed, linear-subulate to linear, green, the outer ones often pubescent; corollas of the disk-flowers usually 4-lobed. [*Erigeron canadense* L.]

Common in waste and cultivated grounds. Naturalized. Native of temperate North America. Flowers nearly throughout the year.

3. Leptilon pusillum (Nutt.) Britton. SMOOTH HORSEWEED. (Fig. 433.) Glabrous or nearly so; stems slender, 3° high or less. Leaves linear to oblanceolate, entire, or the lower sometimes with 2 or 3 teeth near the apex, ciliate toward the base; heads few or numerous; involucre much like that of the preceding species, but glabrous or nearly so, its bracts commonly purplish-tipped. [*Erigeron pusillum* Nutt.]

Common in waste and cultivated grounds, often growing intermixed with *L. canadense*. Naturalized. Native of the eastern United States, the West Indies and tropical continental America. Flowers nearly throughout the year.



9. SENÈCIO [Tourn.] L.

Annual or perennial herbs (some tropical species shrubby or even arborescent), with alternate or basal leaves, and many-flowered heads, of both tubular and radiate, or only tubular flowers, in our species yellow. Involucre cylindric or campanulate, its principal bracts in 1 series, usually with some shorter outer ones. Receptacle mostly naked. Rays, when present, pistillate, fertile. Disk-flowers perfect, fertile, their corollas tubular, the limb 5-toothed or 5-lobed. Anthers obtuse and entire at the base, or rarely slightly sagittate. Achenes terete, or those of the marginal flowers somewhat compressed, 5–10-ribbed, papillose, or canescent, at least after wetting, and then usually emitting a pair of spiral threads. Pappus of numerous slender or capillary, mostly white bristles. [Latin, *senex*, an old man, referring to the hoary character of some species, or to the white pappus.] An immense genus of probably at least 1200 species, of very wide geographic distribution, the following typical.



1. Senecio vulgàris L. Common Groundsel. (Fig. 434.) Annual; stem hollow, usually much branched, 6′–15′ high. Leaves 2′–6′ long, the lower spatulate in outline, petioled, obtuse, the upper sessile or clasping at the base, more deeply lobed or incised, their segments oblong, dentate; heads several or numerous in the corymbs, nearly 3″ broad; bracts of the involucre linear, often blackish-tipped; rays none; achenes slightly canescent.

Common in waste and cultivated grounds. Naturalized. Native of Europe. Widely naturalized in North America. Flowers from spring to autumn.

Senecio mikanioìdes Otto, German or Italian Ivy, South African, is a glabrous herbaceous vine, several feet long, with broadly ovate petioled cordate, sharply 5–7-lobed leaves 2′–4′ broad, and numerous discoid heads of yellow flowers in terminal and axillary clusters; it is sometimes grown in flower-gardens.

Senecio Cinerària DC., Dusty Miller, of the Mediterranean region, a perennial herb 1°–2½° high, the stems, petioles, involucre and under surfaces of the pinnatifid leaves densely white-woolly, the heads of yellow flowers about 1′ broad, the ray-flowers about 12, is commonly grown in flower-gardens. [*Cineraria maritima* L.]

10. **EMÌLIA** Cass.

Herbs, with alternate and basal, often clasping leaves, and long-peduncled, solitary or loosely corymbose heads of pink purple or orange, tubular perfect and fertile flowers. Involucre nearly cylindric, its bracts in a single equal series. Receptacle flat, naked. Corolla-limb cylindric. Achenes nearly terete or 5-angled. Pappus of numerous, soft, white, capillary bristles. [Name unexplained.] About 5 species, natives of the Old World tropics. Type species: *Emilia flammea* Cass.]

1. Emilia sonchifòlia (L.) DC. PURPLE EMILIA. (Fig. 435.) Annual, glabrous, or somewhat pubescent below, usually branched, 8′–2° high. Basal and lower leaves petioled, sometimes 5′ long, obovate to oblanceolate, repand-dentate to lyrate-pinnatifid, obtuse or acute at the apex; upper leaves lanceolate, sessile, sagittate-clasping, dentate, lobed, or entire; heads loosely corymbose, many-flowered; peduncles very slender or filiform; involucre 5″–6″ high, its bracts linear-lanceolate, acute, at length reflexed; flowers rose, or purple. [*Cacalia sonchifolia* L.]

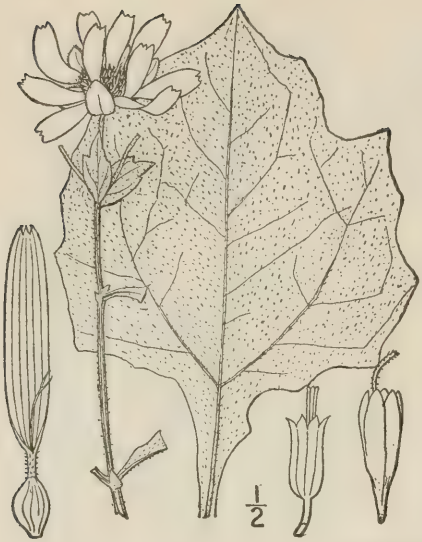
Waste garden grounds, Harrington House, 1909. Introduced. Native of the East Indies. Widely naturalized in the West Indies. Flowers in spring and summer.



Emilia sagittàta (Vahl) DC., ARROW-LEAVED EMILIA, also East Indian, with lanceolate acute sparingly serrate, sagittate-clasping leaves 6′ long or less, the heads of orange or red flowers in long-stalked clusters, was grown in the garden at Somerville in 1914. [*Cacalia sagittata* Vahl.]

11. POLÝMNIA L.

Perennial herbs (some tropical species woody), with opposite membranous lobed or angled leaves, or the lower alternate, and mostly large corymbose-paniculate heads of both tubular and radiate yellow or whitish flowers, or rays sometimes obsolete. Involucre hemispheric or broader, of about 5 large outer bracts, and more numerous smaller inner ones. Receptacle chaffy. Ray-flowers pistillate, fertile, subtended by the inner involucral bracts, the ligules elongated, minute or none. Disk-flowers subtended by the chaffy scales of the receptacle, perfect, sterile, their corollas tubular, 5-toothed. Anthers 2-toothed at the base. Pappus none. Achenes thick, short, turgid, glabrous. [From the Muse Polhymnia.] About 10 species, natives of America. Type species, *Polymnia canadensis* L.

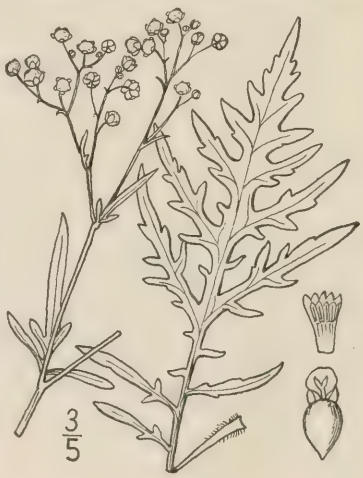


1. Polymnia Uvedàlia L. YELLOW OR LARGE-FLOWERED LEAF-CUP. BEAR'S-FOOT. (Fig. 436.) Rough-pubescent, stout, branched, 2°–6° high. Leaves broadly ovate or deltoid, 3-nerved, abruptly contracted above the base, minutely ciliate, more or less pubescent on both sides, angulate-lobed, the lower often 1° long and broad, petioled, the upper sessile, somewhat clasping; heads few 1½′–2½′ broad; rays 10–15, linear-oblong, bright yellow; exterior bracts of the cup-like involucre ovate-oblong, obtuse, 4″–10″ long; achenes laterally compressed, nearly 3″ long.

Rocky and sandy hillsides, especially between Castle Harbor and Harrington Sound; on Abbots' Cliff, and locally in Paget. Eastern United States. Apparently native, though regarded by Lefroy as naturalized. Flowers from spring to autumn.

12. PARTHÈNIUM L.

Perennial, mostly pubescent or canescent herbs, or shrubs, with alternate leaves, and small corymbose or paniculate heads of both tubular and radiate white or yellow flowers. Involucre broadly campanulate or hemispheric, its bracts imbricated in 2 or 3 series, obtuse, appressed, nearly equal. Receptacle convex or conic, chaffy, the chaff membranous, surrounding the disk-flowers. Ray-flowers about 5, pistillate, fertile, their ligules short, broad, 2-toothed or obcordate. Disk-flowers perfect, sterile, their corollas 5-toothed, the style undivided. Anthers entire at the base. Achenes compressed, keeled on the inner face, margined, bearing the persistent ray on the summit. Pappus of 2–3 scales or awns. [Greek, virgin.] About 12 species, natives of America, the following typical.



1. Parthenium Hysteróphorus L. PARTHENIUM. SANTA MARIA. (Fig. 437.) Annual, strigose or sometimes slightly hirsute. Stems 1°–2½° tall, branched; leaves oblong to ovate in outline, 1–2-pinnately parted, the segments lanceolate to linear, pinnatifid or toothed; heads numerous; involucre saucer-like, about 2½″ broad; bracts concave, the outer rhombic or elliptic-rhombic, the inner broader, cuneate at the base; ray-flowers few; rays whitish, about ½″ broad; achenes obovate, about ½″ long.

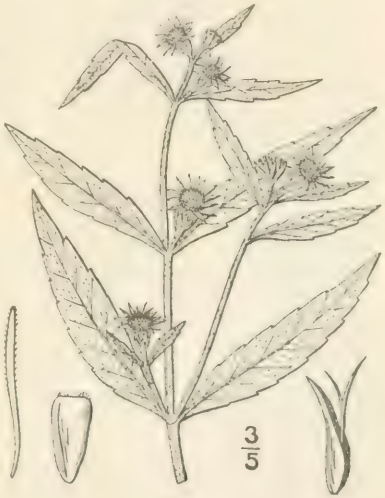
Common in waste and cultivated ground. Naturalized. Native of the southern United States and tropical America. Flowers from spring to autumn.

13. VERBESÌNA L.

Erect or diffuse branching pubescent or hirsute herbs, with opposite leaves, and small pedunculed terminal and axillary heads of tubular and radiate whitish flowers. Involucre hemispheric or broadly campanulate, its bracts imbricated in about 2 series, nearly equal, or the outer longer. Receptacle flat or convex, chaffy, the chaff awn-like, subtending the achenes. Ray-flowers pistillate, fertile. Disk-flowers perfect, mostly fertile, their corollas tubular, 4-toothed or rarely 5-toothed. Anthers entire or minutely 2-toothed at the base. Style-branches of the disk-flowers with obtuse or triangular tips. Achenes thick, those of the rays 3-sided, those of the disk compressed. Pappus none, or of a few short teeth. [Name altered from *Verbena*.] About 4 species, mostly of tropical distribution, the following typical.

1. Verbesina álba L. ECLIPTA. (Fig. 438.) Annual, rough with appressed pubescence, erect or diffuse, 6′–3° high. Leaves lanceolate, oblong-lanceolate or linear-lanceolate, acute or acuminate, denticulate or entire, narrowed to a sessile base, or the lower petioled, 1′–5′ long, 2″–10″ wide; heads commonly numerous, 3″–6″ broad, nearly sessile, or slender-peduncled; rays short, nearly white; anthers brown; achenes 4-toothed, or at length truncate. [*Eclipta erecta* L.; *E. alba* Hassk.]

Frequent in marshes and in wet waste grounds. Native. Southeastern United States and tropical America. Flowers from spring to autumn.



14. BORRÍCHIA Adans.

Fleshy, branching shrubs of the seacoast and salt marshes, with opposite entire or denticulate, cuneate oblong spatulate or obovate, 1–3-nerved leaves, and terminal large long-pedunculed heads of both tubular and radiate yellow flowers. Involucre hemispheric, its bracts imbricated in 2 or 3 series, the inner ones coriaceous. Receptacle convex, chaffy, the chaff rigid, concave, subtending or enwrapping the disk-flowers. Ray-flowers pistillate, fertile. Disk-flowers perfect, the corolla tubular, 5-toothed, the style-branches elongated, hispid. Anthers entire at the base, or minutely sagittate. Achenes of the ray flowers 3-sided, those of the disk-flowers 4-sided. Pappus a short dentate crown. [Named for Olaf Borrick, a Danish botanist.] About 5 species, native of America. Type species: *Buphthalmum frutescens* L.

Scales of the receptacle cuspidate. 1. *B. frutescens*.
Scales of the receptacle acute or obtuse. 2. *B. arborescens*.



1. Borrichia frutéscens (L.) DC. SALTMARSH OX-EYE. (Fig. 439.) Finely canescent, even when old; stems terete, sparingly branched, 1°–4° high. Leaves mostly erect or ascending, narrowly spatulate or obovate, tapering to the sessile base, somewhat connate, 1′–3′ long, 2″–7″ wide; heads solitary or few, about 1′ broad; rays 15–25, rather short; exterior bracts of the involucre ovate and somewhat spreading, the inner ones and the scales of the receptacle cuspidate. [*Buphthalmum frutescens* L.]

Salt marshes and borders of salt water lagoons. Coasts of Castle Harbor. native. Southeastern United States. Flowers in summer and autumn. Presumably reached Bermuda by floating.

2. Borrichia arboréscens (L.) DC. SEA OX-EYE. (Fig. 440.) A branching shrub 1°–6° tall, with silky-canescent or glabrous foliage, sometimes with both gray and green leaves on the same plant. Leaves oblanceolate or spatulate-oblanceolate, 1′–2½′ long, with dark rigid cuspidate tips, entire, sessile; heads 1′ broad or less on club-shaped peduncles; outer involucre-bracts keeled, acute or obtuse, appressed at maturity; the inner larger, rounded at the apex; scale of the receptacle blunt; ray-flowers few. [*Buphthalmum arborescens* L.]

Common on coastal rocks. Native. Florida and the West Indies. Flowers from spring to winter. Presumably reached Bermuda by floating.



15. HELIÁNTHUS L.

Erect, mostly branched herbs, with simple leaves, and large peduncled heads of both tubular and radiate flowers, the rays yellow, the disk yellow, brown or purple. Involucre hemispheric or depressed, its bracts imbricated in several series. Receptacle chaffy, the chaff subtending the disk-flowers. Rays spreading, mostly entire. Disk-flowers perfect, fertile, the corolla tubular,

the tube short, the limb 5-lobed. Anthers entire, or minutely 2-toothed at the base. Style-branches tipped with hirsute appendages. Achenes thick, oblong or obovate, compressed, or somewhat 4-angled. Pappus of 2 scales or awns, or sometimes with 2–4 additional shorter ones, deciduous. [Greek, sunflower.] About 60 species, natives of the New World. Type species: *Helianthus annuus* L.

1. Helianthus débilis Nutt. Low Sunflower. (Fig. 441.) Annual, scabrous, branched, 1°–3° high, the branches mostly spreading or decumbent. Leaves alternate, or the lower opposite, slender-petioled, triangular-ovate to hastate, 1½′–3½′ long, acute or acuminate at the apex, broadly cuneate to subcordate at the base, repand-dentate or coarsely toothed; heads about 2′ broad, long-peduncled; bracts of the involucre linear-lanceolate, ½′ long or less, acuminate; rays 8–15, bright yellow; disk purple, 7″–10″ broad; receptacle nearly flat.

In a field, Middle Road, 1913, collected by F. S. Collins. Introduced. Native of the southeastern United States. Flowers in summer.



Helianthus ánnuus L., Sunflower. North American, a tall broad-leaved annual herb, with rough stems and foliage, large heads at the ends of branches, the disk-flowers purplish, the bright yellow rays often 6′ long, is often grown in gardens for ornament.

Helianthus tuberòsus L., Jerusalem Artichoke. North American, a tall perennial, with rough ovate leaves, the rootstocks bearing edible tubers, the heads 2′–3′ broad, both disk-flowers and rays yellow, is occasionally grown in gardens.

16. BÍDENS [Tourn.] L.

Annual or perennial herbs, with opposite serrate lobed divided or dissected leaves, or the uppermost alternate, and mostly large heads of both tubular and radiate flowers, or the rays none, or rudimentary. Involucre campanulate or hemispheric, its bracts in 2 series, distinct or slightly united at the base; the outer often foliaceous. Receptacle flat or nearly so, chaffy, the chaff subtending the disk-flowers. Rays, when present, neutral. Disk-flowers perfect, fertile, their corollas tubular, 5-toothed. Anthers entire, or minutely sagittate at the base. Style-branches with short or subulate tips. Achenes flat, quadrangular or nearly terete, cuneate, oblong, or linear. Pappus of 2–6 teeth or subulate awns, upwardly or downwardly barbed or hispid. [Latin, two-toothed, referring to the achenes.] About 75 species of wide geographic distribution. Type species: *Bidens bipartita* L.



1. Bidens pilòsa L. WHITE BEGGAR-TICKS. (Fig. 442.) Annual, glabrous or somewhat pubescent, 1°–3° high, more or less branched. Leaves petioled, 3-divided, their segments ovate to lanceolate, 1′–3½′ long, serrate, acute or acuminate, the uppermost sometimes undivided; involucre campanulate, about 4″ high, its outer bracts linear-oblong, usually shorter than the inner; rays, when present, white, 5″–10″ long, 2–3-lobed; achenes fusiform, unequal, the inner longer than the involucre; pappus of 2–4 yellow downwardly barbed awns. [*B. leucantha* Willd.]

Common in waste and cultivated ground. Naturalized. Native of tropical America. Both radiate and rayless races occur. Flowers in summer and autumn.

17. GALINSÒGA R. & P.

Annual branching herbs, with opposite leaves, and small peduncled heads of both tubular and radiate flowers, terminal and in the upper axils. Involucre hemispheric or campanulate, its bracts in 2 series, ovate, obtuse, membranous, striate. Receptacle conic or elongated, its thin chaff subtending the disk-flowers. Ray-flowers white, pistillate, fertile, the rays 4 or 5, short. Disk-flowers yellow, perfect, the corolla 5-toothed. Anthers minutely sagittate at the base. Style-branches tipped with acute appendages. Achenes angled, or the outer ones flat. Pappus of the disk-flowers of several short laciniate or fimbriate scales, that of the ray-flowers of several or few short slender bristles, or none. [Named in honor of M. M. Galinsoga, superintendent of the Botanic Gardens at Madrid.] About 5 species, natives of tropical and warm temperate America, the following typical.

1. Galinsoga parviflòra Cav. GALINSOGA. (Fig. 443.) Slightly appressed-pubescent, 1°–3° high. Leaves thin, ovate or deltoid-ovate, 3-nerved, ¾′–3½′ long, acute at the apex, mostly obtuse at the base, dentate, the lower slender-petioled, the upper short-petioled or sessile, and sometimes nearly or quite entire; heads usually numerous, 2″–3″ broad, slender-peduncled; bracts of the involucre glabrous or nearly so, the outer shorter; pappus of the disk-flowers 4–16, oblong to spatulate, fimbriate obtusish scales, shorter than the finely pubescent obpyramidal achene.



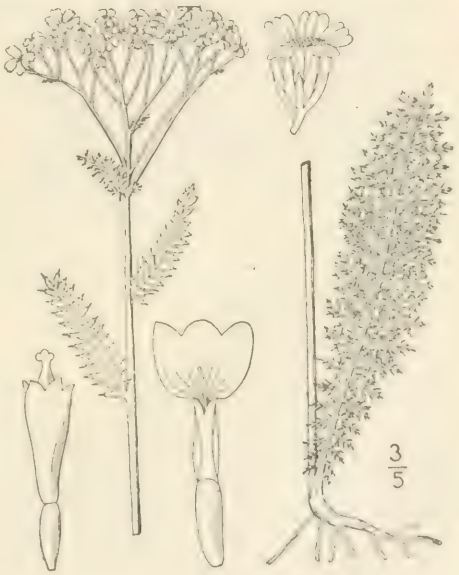
Cultivated grounds, occasional or frequent; first introduced in the Agricultural Gardens in 1908. Naturalized. Native of tropical America. Widely naturalized in the United States. Flowers in summer and autumn, probably also earlier.

18. ACHILLÈA [Vaill.] L.

Herbs, mostly perennial, with erect, leafy stems, finely dissected, pinnatifid or serrate alternate leaves, and small heads of both tubular and radiate flowers, corymbose at the ends of the stem and branches. Involucre obovoid, or campanulate, its bracts appressed, imbricated in few series, the outer shorter. Receptacle nearly flat, or convex, chaffy, the membranous chaff subtending the disk-flowers. Ray-flowers pistillate, fertile, the rays white or pink. Disk-flowers perfect, fertile, their corollas yellow, 5-lobed. Anthers obtuse and entire at the base. Style-branches of the disk-flowers truncate. Achenes oblong or obovate, slightly compressed. Pappus none. [Named for Achilles.] About 75 species, natives of the northern hemisphere, mostly of the Old World. Type species: *Achillea santolina* L.

1. Achillea Millefòlium L. YARROW. MILFOIL. (Fig. 444.) Perennial from horizontal rootstocks; flowering stems sparsely pubescent, or nearly glabrous, simple, or corymbosely branched above, 1°–2° high. Basal leaves and those of the numerous short sterile shoots mostly petioled, sometimes 10′ long and ½′ wide, those of the stem sessile, all somewhat pubescent or nearly glabrous; heads numerous, 2″–3″ broad, in terminal compound dense, somewhat convex corymbs; involucre ovoid, its bracts oblong, stramineous with greenish keel, obtusish, pubescent; rays 4–6, white, or often pink or purple.

Grassy woods, Devonshire, 1905. Introduced. Native of the north temperate zone. Flowers in summer and autumn.



19. ÁNTHEMIS [Micheli] L.

Annual or perennial herbs, with pinnatifid or dissected, alternate leaves, and usually large pedunculed heads of both tubular and radiate flowers, terminating the branches. Involucre hemispheric, its bracts imbricated in several series, scarious-margined, appressed, the outer shorter. Receptacle convex, conic or oblong, chaffy at least toward the summit, the chaff subtending the disk-flowers. Ray-flowers pistillate and fertile, or neutral, the tube terete or 2-winged, the ray white or yellow, entire or 2–3-toothed. Disk-flowers perfect, fertile, yellow, their corollas with 5-cleft limbs. Anthers obtuse and entire at

the base. Style-branches of the disk-flowers truncate. Achenes oblong, angled, ribbed or striate. Pappus none, or a short coroniform border. [Greek name of Camomile.] About 60 species, natives of Europe, Asia and Africa. Type species: *Anthemis maritima* L.



1. Anthemis Cótula L. Mayweed. Dog's, or Fetid Camomile. (Fig. 445.) Annual, glandular and with a fetid odor and acrid taste, much branched, 1°–2° high. Leaves mostly sessile, 1′–2′ long, finely 1–3-pinnately dissected into narrow, or almost filiform, acute lobes; heads commonly numerous, about 1′ broad; bracts of the involucre oblong, obtuse or obtusish, usually somewhat tomentose; rays 10–18, mostly 3-toothed; receptacle convex, becoming oblong, its chaff bristly, subtending the central flowers; achenes 10-ribbed, rugose or glandular-tuberculate; pappus none.

Waste grounds and lawns, occasional. Sometimes cultivated. Introduced. Native of Europe. Widely naturalized in North America. Flowers in spring and summer.

20. CHRYSÁNTHEMUM [Tourn.] L.

Perennial or annual, mostly erect and branching herbs, with alternate dentate incised or dissected leaves, and large, usually long-peduncled heads of both tubular and radiate flowers, or rays rarely wanting. Involucre hemispheric or depressed, its bracts appressed, imbricated in several series, the outer shorter. Receptacle flat, convex or hemispheric, naked. Ray-flowers pistillate, fertile, the rays white, yellow or rose-colored, entire or toothed. Disk-flowers perfect, fertile, their corollas with terete or 2-winged tubes and 4–5-cleft limbs. Anthers obtuse and entire at the base. Style-branches of the disk-flowers truncate, penicillate. Achenes angled or terete, 5–10-ribbed, those of the ray-flowers commonly 3-angled. Pappus none or a scaly cup. [Greek, golden-flower.] About 100 species, of wide distribution in the northern hemisphere. Type species: *Chrysanthemum coronarium* L.

Heads large, solitary or few; leaves obovate to spatulate, dentate or incised. 1. *C. Leucanthemum.*

Heads small, numerous, corymbose; leaves pinnately parted or pinnatifid 2. *C. Parthenium.*

1. Chrysanthemum Leucánthemum L. WHITE-WEED. WHITE OR OX-EYE DAISY. (Fig. 446.) Perennial; stems glabrous, or sparingly puberulent, simple or little branched, 1°–2° high, often tufted, the branches nearly erect. Basal leaves obovate, oblong, or spatulate, coarsely dentate or incised, narrowed into long slender petioles; stem-leaves mostly sessile and partly clasping, 1′–3′ long, the uppermost very small and nearly entire; heads 1′–2′ broad, on long naked peduncles; rays 20–30, white, spreading, slightly 2–3-toothed; bracts of the involucre oblong-lanceolate, obtuse, mostly glabrous, with scarious margins and a brown line within the margins; pappus none.

Frequent in grassy places, especially in Pembroke and Paget. Naturalized. Native of Europe. Widely naturalized in North America. Flowers in summer and autumn.





2. Chrysanthemum Parthènium (L.) Pers. COMMON FEVERFEW. FEATHERFEW. (Fig. 447.) Perennial; stem puberulent or glabrate, much branched, 1°–2½° high. Leaves thin, the lower often 6′ long, petioled, or the upper sessile, pinnately parted into ovate or oblong, pinnatifid or incised segments; heads numerous, corymbose, slender-peduncled, 6″–10″ broad; bracts of the depressed involucre lanceolate, rather rigid, keeled, pubescent, acute or acutish; rays 10–20, white, oval or obovate, spreading, mostly toothed, long-persistent; pappus a short toothed crown. [*Matricaria Parthenium* L.; *Pyrethrum Parthenium* Smith.]

Occasionally escaped from cultivation. Grown in gardens. Native of Europe. Flowers in summer and autumn.

Chrysanthemum frutéscens L., MARGUERITE, of the Canary Islands, a glabrous shrub about 3° high, with green leaves 2′–4′ long, pinnately cleft into narrow segments, the few or solitary heads of white flowers on slender erect peduncles, the rays about ¾′ long, is grown in flower-gardens.

Chrysanthemum morifòlium Ramat., GARDEN CHRYSANTHEMUM, Asiatic, with ovate short-petioled variously toothed, pubescent leaves, the flowers various in color and size, mostly double, is grown in a variety of forms. *Chrysanthemum indicum* L., also Asiatic, differs in having glabrous foliage.

Chrysanthemum coronàrium L., ANNUAL CHRYSANTHEMUM, of the Mediterranean region, occasional in flower-gardens, is a glabrous branched annual, 2°–4° high, with deeply pinnatifid leaves, their narrow segments toothed or incised, the peduncled heads about 2′ broad, the rays light yellow, the disk-flowers yellow.

Chrysanthemum carinàtum L., KEELED CHRYSANTHEMUM, African, also annual and occasionally grown, is glabrous, 1½°–2° high, with deeply pinnatifid leaves, their segments toothed or lobed, the stout-peduncled heads 2′–3′ broad, their involucre-bracts keeled, the notched rays variously colored, the disk-flowers purple.

Chrysanthemum anethifòlium Brouss., GLAUCOUS MARGUERITE, of the Canary Islands, a shrub similar to *C. frutescens* L., but pale green and glaucous, with very finely divided leaves, their segments narrowly linear, the numerous heads slender-peduncled, with white rays about ½′ long, is also occasionally grown.

Chrysanthemum máximum Ramond, LARGE-FLOWERED OX-EYE DAISY, SHASTA DAISY, of the Pyrenees, resembles *C. Leucanthemum* L., but has larger leaves, the basal ones up to 4′ long, spatulate or oblanceolate, obtuse and serrate, the large head always solitary, with numerous white rays 1′–1½′ long. The plant grown as Shasta Daisy is said to be a hybrid of this with some other species.

Ageratum conyzoìdes L., WILD AGERATUM, native of tropical America and widely distributed, recorded as a weed by Lefroy, is not attributed to Bermuda by other authors and has not been observed by recent collectors. It is an annual herb, 3° high or less, with ovate toothed leaves and terminal corymbs of small heads with blue or white flowers, the pappus of 5 to 7 narrow pointed scales, the involucre scales oblong, abruptly acute, nearly glabrous.

Ageratum Houstonìanum Mill., GARDEN AGERATUM, tropical American, is similar to the preceding, but the involucral bracts are linear-lanceolate, acuminate and pubescent. It is commonly grown in flower-gardens. [*A. mexicanum* Sweet.]

Tithonia rotundifòlia (Mill.) Blake, TALL TITHONIA, Mexican, planted for ornament, is an herb 5°–6° tall, with variously lobed and toothed, thin acute leaves 4′–8′ long, green above, pale and canescent with short appressed hairs beneath, the large heads on long peduncles thickened toward the top, the involucre of large, ovate to lanceolate, glabrous striate-nerved bracts in 2 or 3 series, the bright yellow rays 1½′–2′ long. [*T. tagetiflora* Desf.]

Coreopsis grandiflòra Hogg, LARGE-FLOWERED TICKSEED, North American, grown in flower-gardens, is perennial, 1°–2½° high, glabrous or pubescent, the stem bearing several pairs of pinnately parted petioled leaves with linear segments, the basal leaves linear-oblong, entire; the heads of bright yellow flowers are long-peduncled, the 6–10 rays toothed, the achenes broadly winged.

Coreopsis tinctòria Nutt., GARDEN TICKSEED, North American, a nearly glabrous annual, 1°–5° high, with leaves pinnately divided into narrow segments, long-peduncled heads, with 6–10 yellow rays brown at base, ½′–1′ long, and flat, oblong achenes with scarcely any pappus, is grown in flower-gardens.

Coreopsis lanceolàta L., LANCE-LEAVED TICKSEED, North American, perennial, glabrous, 2° high or less, with slender-petioled, narrowly oblong, entire lower leaves, the upper sessile, linear, sometimes with 1 or 2 lobes, the few large heads of bright yellow flowers on long slender peduncles, the 3–7-lobed rays about 1′ long, the pappus of 2 short teeth, is also grown in flower-gardens.

Gaillardia pulchélla Foug., SHOWY GAILLARDIA, North American, occasional in flower-gardens, is a roughish-pubescent annual, 1½°–3° high, with oblong to spatulate leaves, the basal ones sometimes pinnatifid; the few large heads are on long terminal peduncles, with cuneate reddish or orange rays 1′ long or more, brown-veined and often purplish at base; the receptacle is bristly-fimbrillate.

Dahliaròsea Cav., GARDEN DAHLIA, Mexican, is grown in flower-gardens in a variety of forms, mostly double-flowered. [*D. variabilis* Desf.] Its leaves are pinnate, with 3 or 5 ovate pointed serrate leaflets.

Centaurea americàna Nutt., AMERICAN STAR THISTLE, BASKET FLOWER, North American, a tall annual, up to 6° high, roughish, the stem simple, or with few branches, swollen under the large solitary heads, the numerous stem-leaves oblong-lanceolate, sessile, acuminate, 3′–6′ long, mostly entire, the nearly hemispheric involucre 2′–3′ broad, with many pectinate-appendaged shining bracts, the flowers pink or purple, the marginal ones with radiant corolla-limbs, is occasionally grown in flower-gardens.

Centaurea Cỳanus L., CORN-FLOWER, BLUE-BOTTLE, European, frequent in flower-gardens is a white-floccose, branched slender annual 1°–2½° high, its numerous mucronate stem-leaves linear or linear-lanceolate, 2′–6′ long; its flower-heads are on terminal peduncles, the bell-shaped involucre with appressed bracts, their appendages scarious and lacerate, the flowers white, blue or purple, the marginal ones with radiant corolla-limbs ½′ long or longer.

Centaurea moschàta L., SWEET SULTAN, Oriental, occasional in flower-gardens is a glabrous, stiff annual 1°–2° high, with linear-oblong, sharply dentate or pinnatifid stem-leaves, terminal peduncled heads of white, yellow or purple, fragrant flowers, the hemispheric or short-ovoid involucre of broad appressed entire bracts, the upper ones scarious-margined.

Centaurea gymnocárpa Moris. & Not., VELVETY CENTAURY, of Caprea, mentioned by Lefroy as a weed and also recorded by Jones, has not been found wild by recent collectors, but is planted in garden borders. It is a white-velvety perennial, with deeply pinnatifid basal and lower leaves 6′–8′ long, the narrow blunt segments entire or few-toothed, the erect stem 1°–2° high bearing panicled heads less than 1′ broad, of violet or rose-purple flowers.

Tanacetum vulgàre L., TANSY, European, commonly grown in gardens, is mentioned by H. B. Small as sometimes escaped; we have not seen it wild. Tansy is a perennial herb about 2° high, with finely cut leaves and small heads of yellow flowers in nearly flat-topped clusters.

Arctotis stoechadifòlia Berg., BLUE ARCTOTIS, South African, a whitish velvety herb 1°–2° high, with pinnatifid or variously lobed stem-leaves 3′–6′ long, and solitary or few, long-peduncled heads, the involucre subglobose, the narrow pale blue rays 1′ long or less, is grown in flower gardens.

Melampodium perfoliàtum (Willd.) H.B.K., Mexican, a tall annual with opposite broad thin angulate-lobed leaves and slender-peduncled heads of small yellow flowers, the involucre of 5 large ovate bracts, recorded by Reade as rare in plantations prior to 1883, has not been observed by recent collectors. [*Wedelia perfoliata* Willd.]

Crassina élegans (Jacq.) Kuntze, GARDEN ZINNIA, Mexican, commonly grown in flower-gardens, is a pubescent annual 1°–3° high, with ovate to ovate-lanceolate, entire acute sessile and clasping leaves 1′–3′ long and peduncled heads of purple red yellow or white flowers, the involucre with [illegible]

rounded often dark-margined bracts, the rays 1′–2′ long. [*Zinnia elegans* Jacq.]

Gazania spléndens Hort., ELEGANT GAZANIA, South African, a low perennial, with narrowly spatulate, obtuse leaves 2′–4′ long, green above, bright white beneath, and solitary heads on long peduncles, the orange rays about 1′ long, has been grown in flower-gardens. The plant is supposed to be of hybrid origin.

Gerbera Jàmesoni Bolus, "TOMMY ATKINS," South African, one of the most striking plants of this family when in bloom, is a perennial tomentose herb, with basal long-petioled deeply pinnatifid leaves 1° long or more, the scapes about as long as the leaves, bearing solitary heads, the scarlet or orange, linear rays about 1½′ long, the white pappus of many roughish bristles; it is grown in flower-gardens.

Cynara cardúnculus L., CARDOON, of the Mediterranean region, a white-woolly herb 2°–4° tall, with pinnatifid, often spiny leaves, and large heads of purple flowers, the involucre of numerous ovate spine-tipped bracts, the pappus plumose, is occasionally grown in gardens.

Cynara Scolỳmus L., GLOBE ARTICHOKE, sometimes grown for its edible flower-heads, is similar to *C. Cardunculus*, but the involucral bracts are blunt or emarginate; its home is unknown, and it is supposed to have been derîved from the Cardoon in cultivation.

Stokesia laèvis (Hill) Greene, STOKESIA, of the southeastern United States, perennial, with simple or branched stems about 1½° high, woolly above, alternate, oblong to lanceolate, thick nearly glabrous leaves spinulose-toothed toward the base, and large heads of purplish-blue flowers, the rays about 1′ long, the involucral bracts spinulose on the margins, was in cultivation at Spring Valley in 1914. [*Carthamus laevis* Hill; *S. cyanea* L'Her.]

Cosmos sulphùreus Cav., YELLOW COSMOS, Mexican, a glabrous branched annual, about 2° high, with pinnatisect leaves and long-peduncled heads, the outer involucre-bracts linear-lanceolate, much shorter than the oblong inner ones, the rays bright yellow, about 1′ long, the linear rough long-beaked achenes tipped by spreading, nearly filiform awns, is grown in flower-gardens.

Cosmos bipinnàtus Cav., WHITE OR PINK COSMOS, also Mexican, common in flower-gardens, is annual, up to 6° high, with a glabrous branched stem, pinnatisect leaves with very narrowly linear segments, and long-peduncled heads, the outer involucral bracts lanceolate, long-acuminate, the rays white, pink, or sometimes crimson, the narrow achenes short-beaked.

Helichrysum bracteàtum (Vent.) Willd., EVERLASTING, Australian, grown in flower-gardens, is a glabrous annual 2°–3° high, with narrowly oblong-lanceolate entire leaves 3′–5′ long, and several large heads, the many papery shining lanceolate bracts of the involucre 5″–8″ long, yellow, white or red, the flowers yellow. [*Xeranthemum bracteatum* Willd.]

Carthamus tinctòrius L., SAFFLOWER, FALSE SAFFRON, Asiatic, grown for coloring and flavoring soups, and yielding a dye, is a glabrous annual, about 4° high, with sessile ovate veiny spinulose-serrate leaves 1′–2½′ long, and large terminal heads of orange tubular flowers, the oblong achenes devoid of pappus.

Calendula officinàlis L., CALENDULA, POT MARIGOLD, European, common in flower-gardens, both in single and double-flowered races, is a pubescent branched annual, with oblong or lanceolate, sessile clasping acute entire leaves and peduncled heads of yellow or orange flowers, the involucre of narrowly lanceolate acuminate bracts in 1 or 2 series, the rays 1′ long or less, the rough achenes incurved, without pappus.

Gynura aurantiàca (Blume) DC., VELVET PLANT, Javanese, grown for ornament, is a branching pubescent herb about 3° tall, with alternate ovate purple, toothed or lyrate-pinnatifid leaves 2′–5′ long, and loosely clustered heads of yellow or orange flowers. [*Cacalia aurantiaca* Blume.]

Class 2. GYMNOSPÈRMAE.

Ovules (macrosporanges) naked, not enclosed in an ovary, this represented by a scale or apparently wanting. Pollen-grains (microspores) dividing at maturity into two or more cells, one of which gives rise to the pollen-tube (male prothallium), which directly fertilizes an archegone of the nutritive endosperm (female prothallium) in the ovule.

Branching trees or shrubs, with scale-like, flat or needle-shaped leaves; embryo not spirally prolonged.	Order 1. PINALES.
Simple-stemmed woody plants with large compound leaves in a crown; embryo spirally prolonged.	Order 2. CYCADALES.
Widely branching trees with simple petioled fan-shaped leaves, the fruit a drupe.	Order 3. GINKGOALES.

Order 1. PINÀLES.

Trees, or rarely shrubs, growing from both terminal and lateral buds, thus freely branching, the trunks mostly excurrent. Leaves scale-like, linear or needle-like, sometimes fascicled. Flowers mostly monoecious. Fruit a cone, with woody or fleshy scales, or drupaceous.

Fruit a cone, sometimes berry-like.	Fam. 1. PINACEAE.
Fruit mostly a drupe.	Fam. 2. TAXACEAE.

Family 1. PINÀCEAE Lindl.

PINE FAMILY. CONIFERS.

Resinous trees or shrubs, mostly with evergreen narrow entire or scale-like leaves, the wood uniform in texture, without tracheae, the tracheids marked by large depressed disks, the pollen-sacs and ovules born in separate spikes (aments). Perianth none. Stamens several together; filaments more or less united; pollen-sacs (anthers) 2–several-celled, variously dehiscent; pollen-grains often provided with two lateral inflated sacs. Ovules with two integuments, orthotropous or amphitropous, borne solitary or several together on the surface of a scale, which is subtended by a bract in most genera. Fruit a cone with numerous, several or few, woody, papery or fleshy scales, sometimes berry-like. Endosperm copious. Embryo straight, slender. Cotyledons 2 or several. About 25 genera and 250 species of wide distribution, most abundant in temperate regions.

1. JUNÍPERUS L.

Evergreen trees or shrubs with opposite or verticillate, acicular, subulate or scale-like, sessile leaves, commonly of 2 kinds, and dioecious or sometimes monoecious, small globose axillary or terminal aments. Leaf-buds naked. Staminate aments oblong or ovoid; anthers 2–6-celled, each sac 2-valved. Ovule-bearing aments of a few opposite somewhat fleshy scales, or these rarely verticillate in 3's, each bearing a single erect ovule or rarely 2. Cones globose, berry-like by the coalescence of the fleshy scales, containing 1–6 wingless bony seeds. [Name Celtic.] About 40 species, natives of the northern hemisphere, some of them extending into tropical regions. Type species: *Juniperus communis* L.



1. Juniperus bermudiàna L. BERMUDA CEDAR. BERMUDA JUNIPER. (Fig. 448.) An irregularly and rather widely branched tree, conic in outline when young, becoming round-topped when old, with a spread of branches greater than its height, reaching a maximum height of about 70 feet with a trunk up to 4° in diameter, the thin grey bark flaky in long narrow strips. Leaves of young plants and of shoots linear-acicular, ascending, 3″–5″ long, less than $\frac{1}{2}$″ wide, nearly flat and whitish above, convex and bright green beneath, 4-ranked; leaves of mature old twigs scale-like, about 1″ long, closely appressed, imbricated, 4-ranked, ovate or ovate-lanceolate, blunt, the leaf-bearing twigs appearing 4-sided; staminate flowers yellow; fruits compressed and depressed-globose, sessile at the ends of short scale-bearing twigs, dark blue, with a bloom, about 3″ high, 4″ wide and 3″ thick. [*Sabina bermudiana* Antoine.]

Abundant and forming nearly pure forests on hillsides and along marshes in all parishes. Flowers in March and April. Fruit ripe in September and October. Endemic. As one of the most interesting of all trees and the most conspicuous vegetable object of Bermuda, this cedar has an extensive literature. Especial reference is made to the account by Dr. Hooker in London Journal of Botany **2**: 141–145; the paper by Mr. Hemsley in Gardner's Chronicle, **53**: 656, 657, where two illustrations are printed; to Dr. Maxwell F. Masters' account in Journal of Botany **37**: 1–11; to an editorial in Garden and Forest **4**: 289, 290, 294, 295, with reproductions of full-page photographs of the old tree in Devonshire Churchyard and of one of the large trees formerly standing in the Devonshire Marsh; Mr. Hemsley published detailed illustrations on *plate 5*, Botany of the Challenger Expedition. The earliest published illustration known to me is that of Plukenet in 1696, in his Almagestum Botanicum, *plate 197, f. 4*, as *Juniperus barbadensis* cupressi folio, ramulis quadratis; in 1730 another figure was published in a Catalogue of Plants in a Garden near London.

The rules of botanical nomenclature may require the substitution of the name *Juniperus barbadensis* Linnaeus for *Juniperus bermudiana* Linnaeus, the name usually applied to it. Linnaeus published these two species in 1753 on the same page (p. 1039) of his Species Plantarum, *J. barbadensis* standing first in the sequence and both names, it has been argued, refer to the Bermuda Cedar. For a discussion of this point reference is made to the paper by R. Pilger, "Juniperi Species antillanae" in Prof. Urban's Symbolae Antillanae **7**: 478–481. 1913.

The most abundant and characteristic tree of Bermuda. Although supposed by some observers to grow elsewhere, there is no good evidence that it occurs wild except on these islands, although it is recorded as having grown in the West Indies. The wood is red, soft and easily worked; it fades by exposure to the sun; it is used for furniture, coffins, fence-posts, and for a great variety of small objects, such as paper-cutters, boxes and rulers. The tree is planted along streets and for avenue approaches to buildings and can be clipped into arbor-arches and hedges.

Its nearest relative is *Juniperus lucayana* Britton, of the northern Bahama Islands and Cuba, which resembles it in having smaller fruit broader than high, but has much more slender twigs and branches and smaller leaves. The Bermuda tree may, perhaps, have originated from the Bahama species by a seed transported by a bird in northern migratory flight, the plant becoming differentiated through long isolation from its ancestors.

On soil of average fertility the tree grows in height about two feet, and the trunk increases in thickness about half an inch annually up to an age of fifteen or twenty years, after which its growth is progressively slower. Its roots spread widely. The famous ancient tree in Devonshire Churchyard measured 15.43 feet in circumference on Dec. 11, 1912, and then bore only a few leafy branches at the top.

Poetic license is, apparently, responsible for the delusion that this tree is the same as the Cedar of Lebanon

> "With cedars chosen by His hand
> from Lebanon He stores the land."
>
> A. MARVEL.

Cedrus libàni Barrel., the true CEDAR-OF-LEBANON, native of Lebanon and Taurus, was represented by a tree 6° high at the Agricultural Station in 1913. It has fascicled, narrowly linear leaves about 1′ long; the tree becomes 90° high or more, with heavy ovoid cones nearly 3′ long.

Thuja orientàlis L., ASIATIC ARBOR-VITAE, Asiatic, a tree becoming, under favorable conditions, 25° high, planted for ornament, has flattened branchlets, imbricated ovate acute scale-like leaves about 1½″ long, and ovoid cones about 9″ long, composed of about 6 ovate, horned scales. [*Biota orientalis* Endl.] A tree more than 40 years old was growing at Rosebank in 1914, at which date it was 28½ inches in trunk circumference.

Cupressus sempérvirens L., ORIENTAL CYPRESS, of southern Europe and western Asia, where it forms a tree up to 80° high or more, the branches erect or ascending, has occasionally been planted; its short branchlets are covered by ovate blunt scales about ½″ long, and appear quadrangular; its cones are nearly 1′ in diameter, globose, of about 10 scales.

Cupressus macrocárpa Hartw., MONTEREY CYPRESS, Californian, similar to the preceding, but with stouter twigs and larger scales, the branches nearly horizontal, has also been planted.

Chamaecyparis Lawsoniàna (A. Murray) Parl., PORT ORFORD CEDAR, of the northwestern United States, experimentally planted at the Public Garden, St. George's, in 1914, is a very large tree, up to 180° high in its native forests; it has flattened twigs, bearing ovate scale-like appressed leaves, glandular on the back and its globose cones are only 5″ in diameter.

Callitris verrucòsa R. Br., recorded by Jones as *C. varicosa*, an error in spelling, is an Australian conifer, now regarded as the same as *Callitris robusta* R. Br.; it was not observed by us in Bermuda.

Pinus halepénsis Mill., ALEPPO OR JERUSALEM PINE, of the Mediterranean region, was represented at the Public Garden, St. George's, by a young tree in 1913. Its leaves are 4′ long or less, 2 or sometimes 3 together in short membranous sheaths, very narrowly linear and bluish-green. This tree becomes at least 60° high and bears woody cones 2½′–3½′ long.

Pinus palústris Mill., LONG-LEAF PINE of the southeastern United States, of which a large tree exists at Inglewood, planted many years ago, has leaves about 1° long, 3 in each sheath, the cone 6′–10′ long.

Pinus serótina Michx., BLACK PINE, POND PINE, of the southeastern United States, with 3 glaucous leaves in each sheath, 6′–10′ long, was taken to Mt. Langton from the New York Botanical Garden in 1913. The cones of this tree are about 2′ long.

Pinus Stròbus L., WHITE PINE, North American, has been planted, but the climate is too warm for it to grow at all vigorously. An interesting tree seen at Norwood in 1914 was then about 15 years old, but only 7° high. This pine has 5 needles in a sheath, and its cones become 6′ long, their rounded scales without prickles.

H. B. Small mentions a weeping-leaved pine from Central America, seen by him at Bellevue.

Cryptomeria japónica (L. f.) Don, CRYPTOMERIA, of China and Japan, experimentally planted at Wood Haven in 1914, attains a height up to 150° or more in its native region; it has whorled branches, linear angled leaves about

1′ long, rather densely covering the twigs, and globose cones 1′ in diameter, their scales with a recurved dorsal appendage. [*Cupressus japonica* L. f.]

Araucaria Bidwillii Hook., BUNYA-BUNYA, Australian, seen as a young plant at Cedar Lodge in 1914, becomes, under favorable conditions, a tall narrow tree with slender twigs; its stiff lanceolate sharp-pointed leaves are about 1′ long, spreading in one plane, although arranged in two rows; Lefroy records two trees at Mt. Langton in 1877, but they have not survived.

Araucaria excélsa R. Br., NORFOLK ISLAND PINE, is the most luxuriant coniferous evergreen tree that has been introduced into Bermuda, and there are now many fine specimens on lawns; some of them 45° high or more. This tree has nearly horizontal whorled branches, the twigs densely covered with narrow curved leaves about ½′ long; its ovoid blunt cones, about 5′ long, are covered with narrow scales with reflexed tips; lateral branches, when planted, remain prostrate and spread over the ground.

Young plants, about 8′ high, of **Sequoia Washingtoniàna** (Winslow) Sudworth, the MAMMOTH TREE, OR BIG TREE of California, and of **Sequoia sempervirens** (Lamb.) Endlicher, the RED-WOOD, of the Pacific coast of the United States, were seen at Paget Rectory in 1914, grown from seeds germinated there. Lefroy planted a young MAMMOTH TREE in 1874 and records its living up to 1877.

A row of young SPRUCES (**Picea** sp.) were seen at Camden in 1914; they were then not large enough to bear cones, and the species is not determined.

Lefroy records the planting of many kinds of conifers at Mt. Langton, which did not succeed.

Family 2. **TAXÀCEAE** Lindl.

YEW FAMILY.

Trees or shrubs, resin-bearing except *Taxus*. Leaves evergreen or deciduous, linear, the pollen-sacs and ovules borne in separate clusters or solitary. Perianth wanting. Stamens much as in the Pinaceae. Ovules with either one or two integuments; when two, the outer one fleshy; when only one, its outer part fleshy. Fruit drupaceous or rarely a cone. About 8 genera and 75 species, of wide geographic distribution, most numerous in the southern hemisphere.

Podocarpus Makòyi Blume, MAKOY'S PODOCARPUS, Japanese, a shrub or small tree, with linear-lanceolate acute dark-green leaves about 3′ long and 3″ wide, their margins revolute, was taken to Mt. Langton from the New York Botanical Garden in 1913.

Podocarpus coriàceus L. C. Rich., LEATHERY PODOCARPUS, of the eastern West Indies and northern South America, recorded by Jones as growing in Bermuda prior to 1873, forms a tree up to 75° high; its leaves are 4′ to 6′ long, 4″–8″ wide, their margins flat or nearly so.

Order 2. **CYCADÀLES.**

Palm-like or fern-like dioecious woody plants with erect trunks, sometimes short and wholly buried in the ground, growing only from the summit and thus unbranched, although sometimes forming lateral adventitious

buds, the large pinnate leaves in a terminal crown. Flowers in terminal cones, or on modified leaves. Scales of the staminate cones bearing several anther-sacs. Ovule-bearing scales or leaves with two or more naked ovules. Seeds drupe-like or nut-like. Only the following family.

Family 1. **CYCADÀCEAE** Lindl.

CYCAD FAMILY.

Nine genera and about 90 species, of tropical distribution.

Cycas revolùta Thunb., SAGO PALM, of tropical Asia, widely planted for ornament, and very luxuriant, has a cylindric rough trunk up to 7° high, nearly 1° thick, topped by a crown of dark green stiff shining pinnate leaves 3°–6° long, short-petioled, with very numerous, nearly linear leaflets; the flowers are in large yellowish clusters, which alternate with a crown of leaves; rarely a few leaves are borne with the flower-cluster, unfolding at the same time. The leaves are gathered and exported for funeral and other decorations.

Zamia floridàna DC., COONTIE, Floridian, observed growing at Bellevue in 1913, has a vertical stem several inches long, nearly completely buried in the ground, the several pinnate leaves arising in a tuft from its summit, with 28–40 linear leaflets 3½′–6′ long and about 3″ wide; its fruit is an oblong, short-stalked cone of peltate scales; its staminate cones are narrowly oblong; only pistillate plants were seen at Bellevue.

Dioon édule Lindl., CYCAS-LIKE DIOON, Mexican, of which a fine specimen existed at Sunny Lands in 1914, has leaves up to 6° long, similar to those of *Cycas revoluta*, with very many lanceolate rigid entire sharp-tipped segments 3′–4′ long and about 4″ wide; its flowers are borne in a terminal cone, that of staminate flowers cylindric, of pistillate ones ovoid, sometimes 12′ long.

Dioon spinulòsum Dyer, SPINULOSE-LEAVED DIOON, also Mexican, growing with the preceding at Sunny Lands, has leaves as large or larger, their spinulose-toothed segments 5′–6′ long and 8″–10″ broad.

Order 3. **GINKGOÀLES.**

Trees, with broad deciduous leaves and dioecious flowers in the axils of scales. Staminate flowers in catkin-like clusters, the anthers spirally arranged. Pistillate flowers with a solitary ovule which ripens into a fleshy drupe. The order consists of a single species.

Ginkgo bíloba L., MAIDENHAIR-TREE, GINKGO, Chinese, two small trees of which were seen at Bellevue in 1914, is one of the most peculiar and interesting gymnospermous plants, having clustered slender-petioled finely parallel-veined, broadly wedge-shaped, 2-lobed and variously toothed leaves 2′–3′ broad and somewhat broader than long; the flowers are mostly dioecious, the staminate in catkins, the pistillate 2 together, one of the latter ripening into a drupe about 1′ long, its flesh unpleasantly odorous.

Phylum 2. **PTERIDÓPHYTA.**

FERNS AND FERN-ALLIES.

Plants containing woody and vascular tissues, producing spores asexually, which, on germination, develop small flat mostly green

prothallia (gametophyte). On these are borne the reproductive organs, the female known as archegones, the male as antherids. From the fertilization of the egg in the archegone by spermatozoids produced in the antherid, the asexual phase (sporophyte) of the plant is developed; this phase is represented by an ordinary fern, lycopod or horsetail. Comprising about 6000 living species, of which more than three fourths are confined to tropical regions. The native species have all reached Bermuda by spores carried on the wind.

Spores produced in sporanges borne on the leaves, or panicled or in special conceptacles.
  Spores all alike; Bermuda species all terrestrial plants. Order 1. FILICALES.
  Spores of two sizes; small floating plants. Order 2. SALVINIALES.
Spores produced in sporanges borne in the axils of scale-like leaves. Order 3. LYCOPODIALES.

Order 1. FILICÀLES.

Spores, all of one kind and size, produced in sporanges, which are borne usually in clusters (sori), on the back of a leaf, or on greatly modified pinnae.

Sporanges opening vertically, panicled, with a rudimentary ring; marsh ferns. Fam. 1. OSMUNDACEAE.
Sporanges opening transversely, provided with a vertical ring, borne in sori on the back or margin of a leaf. Fam. 2. POLYPODIACEAE.

Family 1. OSMUNDÀCEAE R. Br.

ROYAL FERN FAMILY.

Large ferns with stout often erect rootstocks, 1–2 pinnate leaves which are coiled in vernation, the veins free, mostly forked, running to the margins of the pinnules or lobes. Sporanges large, globose, with mere traces of an elastic ring of cells or none, borne on modified contracted pinnae or in clusters (sori) on the lower surfaces of the pinnules. Three genera; only one American.

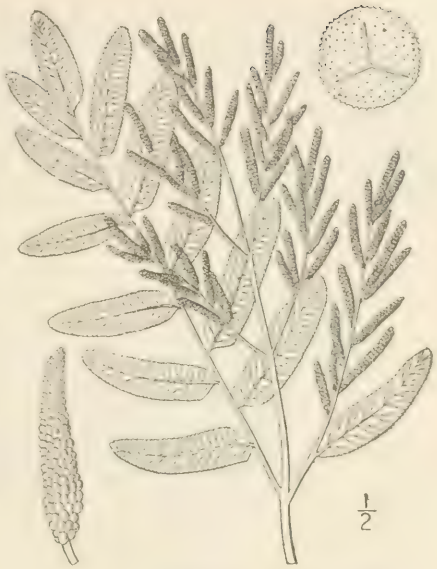
1. OSMÚNDA [Tourn.] L.

Tall marsh ferns, growing in large crowns, with the fertile (spore-bearing) portions very much contracted, the short-pedicelled naked sporanges on the margins of their rachis-like divisions, which are destitute of chlorophyll. Veins forked, regular and prominent. Sporanges thin, reticulated, opening by a longitudinal cleft into two halves, a few parallel thickened cells near the apex representing the rudimentary transverse ring. Spores green. [From Osmunder, a name for the god Thor.] Eight species, mostly of the north temperate zone. Type species: *Osmunda regalis* L.

Leaves bipinnate, fertile at the apex. 1. *O. regalis.*
Sterile leaves once pinnate; pinnae of sterile leaf with a tuft of tomentum at base; fertile leaf distinct from sterile. 2. *O. cinnamomea.*

1. Osmunda regàlis L. ROYAL FERN. (Fig. 449.) Rootstock stout, bearing a cluster of tall bipinnate leaves 2°–6° high, and 1° or more wide. Sterile pinnae 6′–1° long, the pinnules oblong-ovate or lanceolate-oblong, sessile or slightly stalked, glabrous, finely serrulate, especially near the apex and occasionally crenate towards the truncate, oblique or cordate base; sporophylls linear-cylindric, panicled at the summit, withering and shrivelling with age, greenish before maturity, but becoming dark brown after the spores have fallen.

Common in the larger marshes. Native. North America, Europe and Asia.





2. Osmunda cinnamòmea L. CINNAMON FERN. (Fig. 450.) Rootstock large, widely creeping, bearing a circular cluster of sterile leaves with one or more fertile ones within or some leaves partly sterile and partly fertile. Stipes 1° or more long, clothed with ferruginous tomentum when young, glabrous when old; sterile leaves 1°–3° long, glabrous when mature, except a small tuft of tomentum at the base of each pinna; pinnae linear-lanceolate, deeply pinnatifid into oblong obtuse segments; sporophyll contracted, bipinnate, soon withering; sporanges cinnamon-colored after the copious green spores have been discharged.

Common in the larger marshes. Native. Eastern North America to Mexico.

Family 2. **POLYPODIÀCEAE** R. Br.

FERN FAMILY.

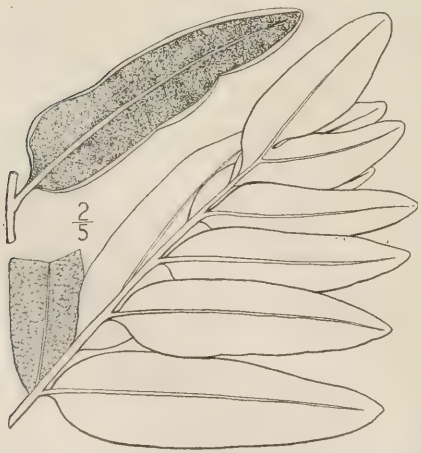
Ferns of various habit, the rootstocks horizontal and often elongated, or short and erect, the leaves entire, pinnate, pinnatifid or decompound,

coiled in vernation. Sporanges borne in clusters (sori) on the lower side or margins of the leaves or their segments, stalked, provided with a vertical ring, opening transversely. Sori with or without a membranous covering (indusium). Prothallium green. About 150 genera and 4500 species of wide distribution.

Sori confluent, covering the under sides of leaf-segments.	1. *Acrostichum.*
Sori separated, not covering leaf-segments.	
Sori without indusia.	2. *Polypodium.*
Sori with indusia.	
Indusia marginal.	
Sporanges on continuous, vein-like receptacles.	
Indusia simple.	
Stipe of leaf with one fibrovascular bundle.	3. *Pycnodoria.*
Stipe with more than one fibrovascular bundle.	4. *Anopteris.*
Indusia double.	5. *Pteris.*
Sporanges at the ends of veins.	6. *Adiantum.*
Indusia dorsal.	
Sori twice as long as wide or longer.	
Sori parallel to the midvein.	7. *Anchistea.*
Sori oblique to the midvein.	
Indusia mostly simple.	8. *Asplenium.*
Indusia commonly double.	9. *Diplazium.*
Sori orbicular or nearly so, or reniform.	
Sori borne on the backs of veinlets.	
Indusia orbicular, peltate.	10. *Polystichum.*
Indusia reniform.	11. *Dryopteris.*
Sori borne at the ends of veinlets.	12. *Nephrolepis.*

1. ACRÓSTICHUM L.

Swamp-inhabiting ferns, with the leaves growing in crowns. Sporanges spread over the whole lower surface of the leaf-blades, or of the upper segments. Veins forming copious areolae without free veinlets. [Greek, signifying a summit row.] A few species, natives of warm temperate and tropical America. Type species: *Acrostichum aureum* L.



1. Acrostichum excélsum Maxon. GIANT FERN. (Fig. 451.) Rootstocks erect, solitary, or in masses. Petioles tufted, erect, woody, 4′–27′ long, flattish, channeled; blades leathery, 3°–4° long, 1°–1¼° wide; segments 10 pairs or more, rather distant; sporanges confined to the upper half or third of the leaf-blade, or all segments spore-bearing, or all without spores; segregate of corpuscles covering sporanges sausage-shaped; venation fine, oblique to the margin. [*A. aureum* of Reade, Hemsley, Jones and Lefroy; *A. lomarioides* Jenman, not Bory.]

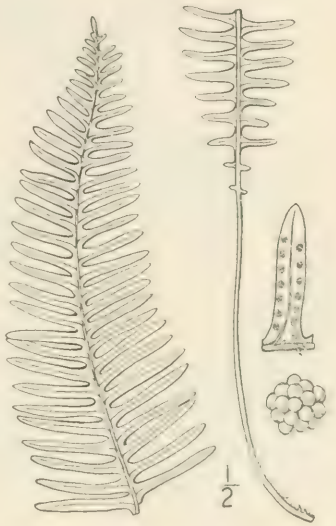
Common in marshes. Native. Florida and the West Indies. Small plants have been referred to the tropical American *A. aureum* L., which differs in having star-shaped segregates of the corpuscles covering the sporanges.

2. **POLYPÒDIUM** [Tourn.] L.

Pinnate or simple ferns with stipes articulated to the creeping rootstocks. Sori hemispheric, dorsal, in one or more rows on either side of the midribs. Indusium none. Sporanges pedicelled, provided with a vertical ring which bursts transversely. Veins free or variously anastomosing. [Greek, in allusion to the knob-like prominences on the rootstocks of some species.] About 350 species, of wide distribution, mostly tropical. Type species: *Polypodium vulgare* L.

1. Polypodium Plùmula H.B.K. PLUME POLYPODY. (Fig. 452.) Leaves erect or spreading; petioles 1′–4′ long, black, slender; blades narrowly lanceolate, 8′–16′ long; pinnae numerous, narrow, entire, blunt, the lower abruptly smaller, the surfaces naked except the black wiry rachis; veins once forked, obscure. [*P. elasticum* A. Rich.; *P. pectinatum* of Jones.]

Shaded holes and crevices between Harrington Sound and Castle Harbor. Native. Florida and the West Indies.



Polypodium pectinàtum L., a similar Floridian and tropical American species, is recorded as Bermudan by Rein, and by Hemsley from Walsingham, but subsequent collectors have failed to find it in Bermuda. It differs by being usually larger and in having veins 2–3-forked.

3. **PYCNODÒRIA** Presl.

Mostly large ferns, the petioles not jointed with the rootstocks, the leaves variously divided. Sori marginal, continuous or nearly so, on a filiform or narrow receptacle connecting the tips of the free veins; indusium simple, membranous, formed by the reflexed margin of the leaf. Sporanges pedicelled, provided with a vertical ring which bursts transversely. [Greek, thick-skinned.] Many species, of warm and tropical regions. Type species: *Pteris opaca* J. Smith.



1. Pycnodoria longifòlia (L.) Britton. LONG-LEAVED BRAKE. (Fig. 453.) Leaves somewhat spreading; petioles 6′–12′ long, clothed below with pale brown scales; blades oblong-lanceolate, 1°–2° long; pinnae linear, 2″–5″ wide, entire, sessile; veins close, usually once branched; indusium yellowish brown. [*Pteris longifolia* L.]

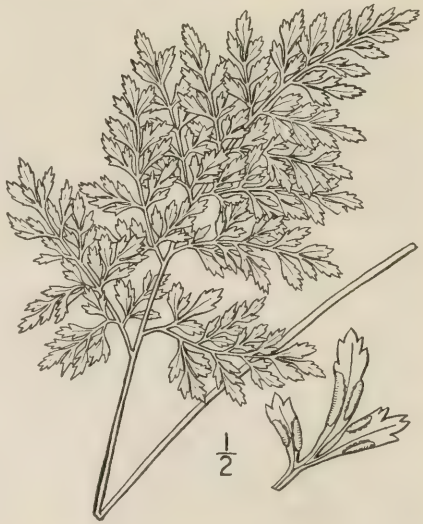
Abundant on walls and banks in Hamilton and vicinity and locally elsewhere. Naturalized. Native of Florida and tropical America. First recorded as established in Bermuda by Reade in 1883; it was planted out in suitable localities by Lefroy about 1875.

4. ANÓPTERIS [Prantl] Diels.

A delicate bright green fern, with short rootstocks and pinnately dissected dimorphous leaves, their petioles with several main fibrovascular bundles. Indusium simple, marginal, lateral on the pinnules. [Greek, not *Pteris*.] A monotypic West Indian genus.

1. Anopteris hexágona (L.) Christensen. CUT-LEAVED BRAKE. (Fig. 454.) Roots thick-fibrous; leaves tufted, 6′–2° long, with slender straw-colored shining petioles; leaves ovate in outline, 2–3-pinnate, the pinnules of the sterile leaves broader than those of the fertile; indusium membranous, linear, not extending to the apex or the base of the obovate cuneate, serrate pinnules. [*Adiantum hexagonum* L.; *Pteris heterophylla* L.]

Local in caves and crevices between Harrington Sound and Castle Harbor. Native. West Indies.

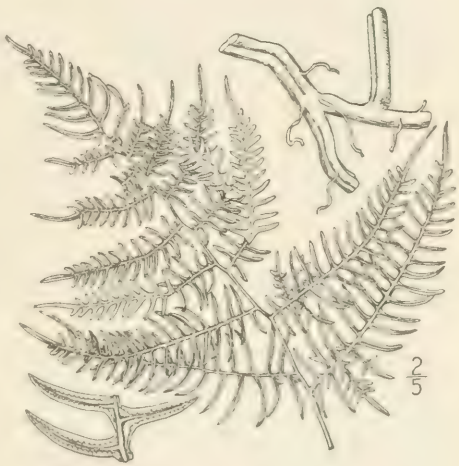


5. PTÈRIS L. (*Pteridium* Scop.)

Large, mostly coarse ferns, growing in open sunny places, with variously divided leaves, and marginal linear continuous sori which occupy a slender or filiform receptacle, connecting the tips of free veins. Indusium double, the outer one conspicuous, membranous, formed of the reflexed margin of the leaf, in inner one delicate and obscure. Stipes continuous with the rootstock. [Greek name for ferns, from the fancied resemblance of their leaves to the wings of birds.] A few species of wide distribution. Type species: *Pteris aquilina* L.

1. Pteris caudàta L. SOUTHERN BRACKEN. (Fig. 455.) Leaves erect, 3°–6° tall; blades triangular in outline, 2–4-pinnate; divisions pinnatifid, the ultimate segments narrow, with recurved margins, remote from one another, scarcely decurrent on the rachis except near the apex, the larger with 1–12 similar but shorter segments. [*P. aquilina* of Jones and Lefroy; *P. aquilina caudata* Hemsley; *Pteridium caudatum* Maxon.]

Abundant in fresh water marshes, and occurs also in shaded rocky situations between Harrington Sound and Castle Harbor. Native. Florida and the West Indies.



6. ADIÁNTUM [Tourn.] L.

Graceful ferns of rocky hillsides, woods, and ravines, with much divided leaves and short marginal sori borne on the under side of the reflexed and altered portion of the pinnule, which serves as an indusium. Stipes and branches of the leaves slender or filiform, often polished and shining. [Name ancient.] A genus of over 175 species, mostly of tropical America. Type species: *Adiantum Capillus-Veneris* L.



1. Adiantum béllum T. Moore. BERMUDA MAIDEN-HAIR FERN. (Fig. 456.) Rootstock short, creeping. Leaves tufted, 3′–18′ high, the slender petiole and rachis black; blades bipinnate, the pinnules on short filiform stalks, obovate-cuneate or flabellate, variously toothed or lobed, very thin, 3″–10″ long, the forking veins terminating in the teeth or lobes; sori 1–3 on fertile pinnules, oblong to nearly circular, sometimes twice as long as wide, the indusium entire; sterile leaves are much more plenty than those bearing sori. [*Adiantum cuneatum* of Lefroy, Reade, and Jones; *A. bellum walsinghamense* Gilbert; *?A. tenerum* of Rugg; *A. Capillus-Veneris* of Jones.]

Common on shaded rocks, walls and cliffs nearly throughout the islands, differing greatly in size and somewhat in texture when exposed to different degrees of light. Apparently endemic, although recorded from Guiana. Its nearest relative appears to be *A. cuneatum* Langs. & Fisch., a South American species, with which it was formerly supposed to be identical, but T. Moore, in his original description of the species (Gardener's Chronicle, N. S. **11**: 172, 1879), compares it with *A. fragile* of the West Indies. Spores, from which the species originated, were presumably brought to Bermuda by winds from a great distance to the south. Thomas Moore, who first observed that this fern is different from all others, was not the same man as the celebrated poet of the same name.

Adiantum Capillus-Véneris L., VENUS-HAIR FERN, of Europe and North America, was planted out by Lefroy about 1875, among other *Adianta* "in promising localities about Paynter's Vale"; Mr. B. D. Gilbert records that in 1898 he found the fern in the Walsingham region, evidently coming across one of the plants set out by Lefroy, or a descendant; the species has not been seen there by subsequent collectors, but large fronds of *A. bellum* have erroneously been taken for it.

7. **ANCHÍSTEA** Presl.

Large and rather coarse swamp ferns, with short oblong sori sunk in cavities in the leaf and arranged in chain-like rows close to the midribs. Leaves uniform. Indusia fixed by their outer margins. Veins forming a single line of areolae next the midrib, then free to the margin. [Greek, referring to its affinity with the genus *Woodwardia*.] A monotypic genus.

1. Anchistea virgínica (L.) Presl. VIRGINIA CHAIN-FERN. (Fig. 457.) Rootstock stout, chaffy. Petioles stout, 1°–1½° long, nearly or quite naked, dark-colored below; blades oblong-lanceolate, acute, narrowed at the base, 1°–2° long, 6′–9′ wide, once pinnate; pinnae linear-lanceolate, usually alternate, or some of them opposite, leathery, glabrous, acuminate, sessile, 2½′–6′ long, deeply pinnatifid into ovate or oblong obtuse segments, their margins minutely serrulate. [*Blechnum virginicum* L.; *Woodwardia virginica* J. E. Smith.]

Frequent in the larger freshwater marshes. Native. Eastern North America.



8. ASPLÈNIUM L.

Large or small ferns with entire lobed pinnate, 2–3-pinnate, or pinnatifid leaves, and linear or oblong sori oblique to the midribs or rachises. Leaves mostly uniform. Veins free. Indusia straight or curved, opening toward the midribs. [Ancient Greek name; some species were supposed to be remedies for diseases of the spleen.] A genus of some 400 species, of very wide geographic distribution. Type species: *Asplenium Trichomanes* L.

Leaves once pinnate.
- Pinnae 6–8 pairs; stipes blackish only at the base. 1. *A. dentatum.*
- Pinnae 20–40 pairs; stipes black, shining. 2. *A. heterochroum.*

Leaves finely twice or thrice pinnate. 3. *A. monteverdense.*

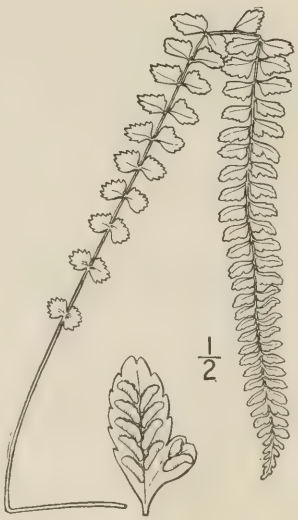


1. Asplenium dentàtum L. TOOTHED SPLEENWORT. (Fig. 458.) Petioles tufted, 2′–6′ long, naked, weak, blackish below. Fertile leaf-blades 2′–3′ long, with 6–8 pairs of stalked oblong or rhombic pinnae, the lower side truncate with a curve, the outer edge irregularly crenate; sterile leaves similar but with shorter petioles; rachis naked; sori copious, in parallel rows.

Shaded rocks, caves, holes and crevices between Harrington Sound and Castle Harbor and on Abbot's Cliff; recorded by Lefroy from Grace's Islnad. Native. Southeastern United States and West Indies.

2. Asplenium heterochròum Kunze. LONG SPLEENWORT. (Fig. 459.) Rootstock short; petioles tufted, black, ½′–4′ long, stiff, erect or somewhat spreading; leaf-blades linear in outline, 6′–16′ long, 1′ wide or less, once pinnate, with mostly 20–40 pairs of pinnae; pinnae close together or the lower distant, mostly opposite, very nearly sessile, oblong, obtuse, few-toothed, or the lower nearly orbicular and much smaller than the middle ones, all subtruncate at the base; veins, except the lowest on the upper side of the pinna, simple; sori oblique, about 1½″ long, borne close to the midvein, the indusium membranous. [*Asplenium Trichomanes* of Reade, Lefroy, Hemsley and Rugg; *A. Trichomanes majus* of Gilbert; *A. muticum* Gilbert.]

Common on cliffs, walls and shaded rocks in most parts of the islands. Native. Florida, Cuba, Porto Rico. For some years after the description of this fern by Mr. B. D. Gilbert, as *Asplenium muticum* (Am. Bot. 4: 86, 1903), it was supposed to grow only in Bermuda and in Florida, but Mr. W. R. Maxon has recently pointed out its equivalency with *A. heterochroum*.





3. Asplenium monteverdénse Hook. PARSLEY FERN. (Fig. 460.) Rootstock very short; roots very slender. Leaves tufted, 10′ long or less, the petiole smooth, much shorter than the delicately 2–3-pinnate blades, which are oblong-lanceolate in outline and long-acuminate; pinnae lanceolate or ovate-lanceolate in outline, mostly 12–15 on each side of the rachis, the middle pairs ¾′–1½′ long, the lower much smaller; pinnules obovate-cuneate in outline, deeply incised or divided into several oblong, or obovate-cuneate obtuse or acute segments; sori few, scattered. [*A. myriophyllum* of Lefroy and Gilbert; *A. rhizophyllum* of Hemsley and Verrill; *A. cicutarium* of Jones.]

Local, in a cave between Harrington Sound and Castle Harbor. Native. Cuba, Hispaniola, Jamaica.

9. DIPLÀZIUM Sw.

Mostly large ferns, with simple or compound leaves, the venation free. Sori linear, borne at the sides of veinlets, the indusium mostly of a double membrane. [Greek, referring to the double indusium.] Many species, of tropical and subtropical distribution. Type species: *Asplenium plantaginifolium* L.



1. Diplazium Laffaniànum (Baker) Christensen. GOVERNOR LAFFAN'S FERN. (Fig. 461.) Rootstock short, erect or oblique, bearing several leaves, somewhat scaly. Petioles 4′–8′ long, blackish and scaly toward the base, green and naked above, the brown lanceolate acuminate scales 2″–3″ long; blades bipinnate, ovate-deltoid in outline, 8′–12′ long, about half as wide as long, bright green, rather firm in texture, smooth on both sides; pinnae lanceolate in outline, nearly sessile, 3½′–5′ long, close together; pinnules oblong to lanceolate, obtuse, or the larger acute, serrate, or the larger incised; sori 1″–2″ long, simple, or mostly so, slightly curved, the persistent indusium glabrous, membranous. [*Asplenium Laffanianum* Baker; *A. crenulatum* of Lefroy.] Illustrated at *pl. 12* Botany of the Challenger Expedition.

Local, in caves and crevices between Harrington Sound and Paynters' Vale, where it existed up to 1905, but has, since, apparently, been exterminated. Endemic. Nearest related to *A. Mildei* Kuhn, of the Andes of Ecuador, according to Gilbert; allied to the West Indian *A. Francomis* and *A. crenulatum*, according to Baker.

This interesting fern was first described by Mr. J. G. Baker in Gardener's Chronicle, 51: 673, 1882, from a living plant sent by Governor Sir Robert Laffan to the Royal Gardens, Kew, in 1880, and from a dried specimen contributed by Governor Lefroy in 1874. It was probably easily found in these years, but by 1905 it had become very rare; the plant was observed by us in the wild state in the autumn of that year, but we could not find it again at a known locality in 1913. Two plants were taken to a private greenhouse in Hamilton some years ago, where we had the pleasure of studying them in 1914, and afterwards made the attempt to raise plants from spores then obtained, unfortunately without success, the spores being immature.

10. **POLÝSTICHUM** Roth.

Coarse pinnate or bipinnate ferns growing from an erect rootstock, with round sori usually borne on the backs of the veins, the sterile and fertile leaves similar in outline. Indusium superior, centrally peltate, orbicular. Stipe continuous, not jointed with the rootstock. Veins free. [Greek, signifying many rows, without obvious application.] Some 100 species of wide distribution. Type species: *Polystichum Lonchitis* (L.) Roth.



1. Polystichum adiantifòrme (Forster) J. Smith. TEN DAY FERN. DEVONSHIRE MARSH FERN. (Fig. 462.) Rootstock stout, creeping; leaves several, 1°–4° high, subcoriaceous, 2–3-pinnate. Lower pinnae the largest, sometimes 1° long, 3′–4′ wide; pinnules ovate-lanceolate in outline, acuminate; ultimate segments or lobes oblong or oblong-lanceolate, acutish serrate; rachis smooth and somewhat shining; stipes scaly at the base; sori nearly 1″ broad, mostly in 2 rows between the margin and the midvein of the segments. [*Polypodium adiantiforme* Forster; *Aspidium capense* Willd.; *Dryopteris capensis* Gilbert; *Aspidium coriaceum* of Hemsley and of Verrill.]

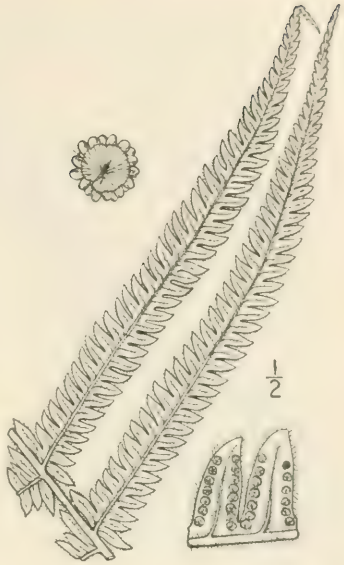
Local in Devonshire Marsh, and among shaded rocks between Harrington Sound and Castle Harbor. Native. West Indies, South America, Polynesia, Africa. Figure 462 shows a single pinna.

Polystichum aculeàtum (L.) Schott is recorded by Hemsley as found at caves by Lefroy, and also mentioned as Bermudan by Rein, by Verrill, and by Jones, but it has not been seen here recently. It may have been in cultivation, or may have been mistaken for *P. adiantiforme.* [*Dryopteris aculeata* Kuntze; *Aspidium aculeatum* Sw.]

11. **DRYÓPTERIS** Adans.

Ferns with 2–3-pinnate or pinnatifid leaves and round sori usually borne on the backs of the veins, the fertile and sterile leaves similar in outline. Indusium flattish, cordate, reniform, superior, fixed by its sinus. Stipe continuous, not jointed with the rootstock. Veins free or anastomosing. [Greek, signifying oak-fern, in allusion to the forest habitat of most species.] Species several hundred, of wide distribution. Type species: *Polypodium Filix-mas* L.

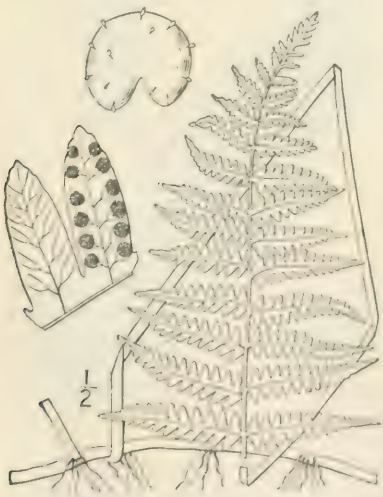
Leaves once pinnate.	
Pinnae all sessile.	
Veinlets not forked.	1. *D. normalis.*
Veinlets forked.	2. *D. Thelypteris.*
At least the lower pinnae short-stalked.	3. *D. bermudiana.*
Leaves bipinnate or tripinnate.	4. *D. speluncae.*



1. Dryopteris normàlis C. Christensen. LARGER MARSH SHIELD-FERN. (Fig. 463.) Rootstocks horizontal. Leaves several together, the blades oblong, 1°–4° long, softly pubescent beneath; pinnae linear, acuminate, cleft three-fourths the way to the midrib; segments numerous, the basal ones longest; veinlets manifest, unforked, the lowest ones of adjacent segments often uniting; sori near the margins; indusia pubescent. [*Aspidium patens* and *Nephrodium patens* of previous authors, not *Aspidium patens* Sw.]

Common in marshes and occasional on shaded hillsides. Native. Florida, West Indies.

Dryopteris mollis [*Aspidium molle* Sw.; *Nephrodium molle* Desv.], admitted as Bermudan by Reade, by Jones, and by Hemsley, is recorded by Lefroy as planted out by him about 1875. There is no evidence that it ever grew naturally in Bermuda.



2. Dryopteris Thelýpteris (L.) A. Gray. MARSH SHIELD-FERN. (Fig. 464.) Rootstocks slender, creeping. Leaves erect; blades oblong-lanceolate, scarcely narrower at the base than at the middle, 1°–3° long, short-acuminate, membranous, pinnate; pinnae linear-lanceolate, short-stalked or sessile, mostly horizontal, acuminate at the apex, nearly truncate at the base, 1′–2½′ long, slightly pubescent beneath, deeply pinnatifid; segments oblong, obtuse, or appearing acute from the strongly revolute margins, the veins regularly once or twice forked; sori crowded, 10–12 to each segment; indusia reniform, slightly glandular, or glabrous. [*Acrostichum Thelypteris* L.; *Aspidium Thelypteris* Sw.]

Frequent in fresh-water marshes. Native. Temperate North America and Europe.



3. **Dryopteris bermudiàna** (Baker) Gilbert. BERMUDA SHIELD-FERN. (Fig. 465.) Rootstock thick, creeping, chaffy at the crown with lanceolate acuminate scales. Leaves 2° long or less, 3′–6′ wide, pinnate, the rachis pilose; pinnae 1½′–3′ long, ½′–1′ wide, very short-stalked, blunt, cut about halfway to the midvein, dark green and canescent above, paler beneath, their lobes blunt, entire, the basal ones on one or both sides enlarged; veinlets of the lobes 5–7 pairs, unforked, pilose beneath, the lowest veinlets uniting into a vein running to the sinus; sori small; involucre small, reniform, fugacious. [*Nephrodium bermudianum* Baker; *Nephrodium tetragonum* of Lefroy and of Hunter.]

In caves, holes and crevices between Harrington Sound and Castle Harbor. Endemic. Illustrated in Botany of the Voyage of the Challenger *plate 13*, in which work it was first described (p. 86) by Mr. J. G. Baker in 1885. Its nearest relative appears to be *D. asplenioides* (Sw.) Kuntze, of Jamaica.

4. **Dryopteris spelùncae** (L.) Underwood. BERMUDA CAVE-FERN. (Fig. 466.) Rootstocks. Leaves 2°–3½° long, bipinnate or tripinnate, broadly ovate, nearly or quite as wide as long, the stipes and rachis paleaceous and pubescent with crisped hairs; pinnae ovate to ovate-lanceolate, the lower somewhat stalked, the upper sessile; pinnules oblong to oblong-lanceolate, obtuse or acutish, crenate-serrate or the larger ones lobed, pubescent on the veins beneath, the veins simple; sori borne about halfway from the midvein to the margin of the pinnules. [*Polypodium speluncae* L.; *Nephrodium villosum* of Rein, Lefroy and Hemsley; *Dryopteris villosa* of Gilbert.]

Caves, holes and ledges, between Harrington Sound and Castle Harbor, and near Smith's Church. Endemic. Nearest related to *Dryopteris ampla* (H.B.K.) Kuntze, of Florida, West Indies and South America, to which it was erroneously referred by Lefroy, Hemsley and Verrill.



12. **NEPHRÓLEPIS** Schott.

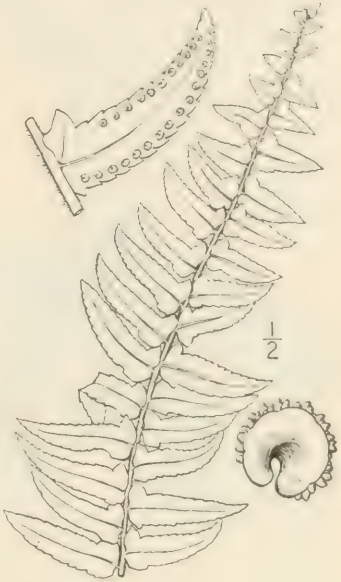
Leaves spreading or pendent, pinnate, elongated; pinnae numerous, approximate, jointed at the base, with whitish dots on the upper surface. Sori round, arising from the apex of the upper branch of a vein, usually near the

margin. Veins free. [Greek, referring to the shape of the indusium.] About 12 species, natives of tropical and warm-temperate regions. Type species: *Polypodium exaltatum* L.

1. Nephrolepis exaltàta (L.) Schott. SWORD-FERN. (Fig. 467.) Petioles 4′–6′ long; leaf-blades 3° long or less; pinnae sessile, lanceolate, sometimes crenulate, 1′–3′ long, the upper side auricled at the base, the lower rounded, the rachis quite **hairy**; sori almost marginal, covered with firm distinctly reniform indusia. [*Polypodium exaltatum* L.; *Aspidium exaltatum* Sw.]

Frequent in the marshes and on shaded rocks between Harrington Sound and Castle Harbor; and on Abbot's Cliff. Native. Florida and the West Indies.

Lefroy records the introduction by him of many species of ferns for cultivation, and ferneries have been maintained by other residents from time to time, but few species will flourish without careful attention, much moisture and proper protection. Jones, in 1873, mentions a number of species, evidently in cultivation at that time.



Order 2. SALVINIÀLES.

Aquatic or mud-inhabiting herbs, with horizontal or creeping stems, or floating. Leaves various, sometimes filiform, or blades entire, lobed or 4-foliolate. Spores of two kinds (microspores and macrospores), contained in sporocarps. Macrospores germinating into simple prothallia which bear archegones, the microspores forming still simpler prothallia bearing antherozoids.

Family 1. SALVINIÀCEAE Reichenb.

SALVINIA FAMILY.

Small floating plants with a more or less elongated and sometimes branching axis bearing 2-ranked leaves. Sporocarps soft, thin-walled, borne 2 or more on a common stalk, in the axils of the submersed leaves, 1-celled, with a central often branched receptacle, which bears macrosporanges containing a single macrospore or microsporanges containing numerous microspores. The family consists of two genera.

1. SALVÍNIA Adans.

Floating annual plants with slender stems bearing rather broad 2-ranked floating leaves. Sporocarps globose, depressed, 9–14-sulcate, membranous, arranged in clusters, 1 or 2 of each cluster containing 10 or more sessile macrosporanges, each containing few macrospores, the others containing numerous

smaller globose pedicelled microsporanges with very numerous microspores. Leaves green, finely papillose on the upper surface. [Name in honor of Antonio Maria Salvini, 1633–1729, Italian scientist.] About 13 species of wide distribution. Type species: *Salvinia natans* (L.) Hoffm.



1. Salvinia Olfersiàna Klotzch. OLFERS' SALVINIA. (Fig. 468.) Completely covering the surface of still water, the floating leaves more or less overlapping, the slender stems 2′ long or more, pilose. Floating leaves broadly ovate, 6″–10″ long, short-petioled, cordate at the base, obtuse or notched at the apex, pinnately delicately many-veined, the upper surface bearing many short 4-horned or 5-horned papillae; submerged leaves short-petioled, several-parted, root-like, 1½′–3′ long, bearing the clustered globose-ovoid sporocarps.

Common in ditches in Pembroke Marsh. Naturalized; apparently of recent introduction. First observed by us in 1905. Native of tropical continental America. H. B. Small, erroneously designating this plant *Lemna trisulca*, states that it was introduced in 1903.

Order 3. LYCOPODIÀLES.

Spores produced in sporanges, which are borne in the axils of scale-like or elongated leaves.

Spores all alike. — Fam. 1. PSILOTACEAE.
Spores of two kinds. — Fam. 2. SELAGINELLACEAE.

Family 1. PSILOTÀCEAE Pritzel.

PSILOTUM FAMILY.

Perennial slender terrestrial or epiphytic plants. Sporanges sessile in the axils of the leaves, 2–3-celled, opening by valves at the apex. Spores uniform.

1. PSILÒTUM R. Br.

Terrestrial or sometimes epiphytic, the stem dichotomously forked. Leaves alternate, reduced to scales. Sporanges 3-celled, opening by 3 valves at the apex. Spores mealy, oval or elongated-reniform. [Greek, referring to the nearly naked stems and branches.] A few species of tropical and subtropical distribution, the following typical.

1. Psilotum nùdum (L.) Griseb. PSILOTUM. (Fig. 469.) Stems erect, 8′–12′ tall, or, when growing in caves, often pendent, 3-angled at the base, copiously forked above, the ultimate divisions with 3 wing-like angles; leaves remote, awl-like, less than 1″ long; sporanges in interrupted spikes. [*Lycopodium nudum* L.; *P. triquetrum* Sw.]

At bases of palmettos in Paget Marsh, and in caves and in bases of trees between Harrington Sound and Castle Harbor. Recorded by Verrill as having grown on Ireland Island. Verrill uses for this plant the name "Sea-side Club Moss" which is misleading, as it does not grow in proximity to the sea, and should be excluded from his list of sea-side plants. Native. Southeastern United States, West Indies and tropical continental America.



Family 2. **SELAGINELLÀCEAE** Underw.

SELAGINELLA FAMILY.

Terrestrial, moss-like plants with branching stems and scale-like leaves. Sporanges 1-celled, solitary in the axils of leaves which are so arranged as to form more or less quadrangular spikes, some containing 4 macrospores (macrosporanges), others containing numerous microspores (microsporanges). The family consists of the following genus:

1. **SELAGINÉLLA** Beauv.

Characters of family. [Name diminutive of Selago, ancient name of a *Lycopodium*.] About 600 species, widely distributed, most abundant in tropical regions.

Selaginella viticulòsa Klotzch, SELAGINELLA, South American, a trailing moss-like plant, with minute bright green leaves spreading in 2 planes, the two kinds of sporanges borne in narrow spikes, one containing 4 large spores, the other containing many very minute spores, was observed in 1912 covering a shaded wall at Mt. Langton, apparently well established, escaped from a greenhouse nearby, suggesting that this beautiful plant might readily be grown in other similar situations. It is occasionally planted on rock-work.

Other species of *Selaginella* have been grown at times as house plants and under glass.

A species of *Equisetum* was recorded by Lefroy, and doubtfully referred to *E. bogotense* by Verrill, but no trace of any plant of this genus has been found by recent collectors. (See p. 50.)

Phylum 3. BRYÒPHYTA.

Mosses and Hepatics.

Small plants, producing minute usually spherical bodies (spores) in capsules, from which arise a protonema on which are borne the plants (gametophytes) bearing archegonia and antheridia, from which the fruit (sporophyte) is formed, which in turn bears spores.

There are two classes which differ from each other as follows:

Stems erect or prostrate, having leaves more or less equally developed on all sides; calyptra at the apex of the capsule. Class 1. Musci.
Stems usually prostrate, with the leaves, when present, unequally developed on the upper and lower surfaces; calyptra at the base of the capsule. Class 2. Hepaticae.

Class 1. MÙSCI.

Mosses.

Contributed by Elizabeth G. Britton.

Terrestrial, epiphytic, or rarely aquatic plants, showing two distinctly marked but closely connected and continuous phases of growth, or alternate generations. Plant (gametophyte) usually differentiated into stem, leaves and rhizoids (true roots none), arising from a more or less ephemeral protonema, which originates from the spore, forming either a filamentous or thallose growth. Sexual organs borne either apically or laterally on the stem, usually in special buds; antheridia and archegonia on the same plant or on separate plants. Antheridium containing ciliate sperms. Archegonium a single egg, after the fertilization of which the embryo develops into the fruit (sporophyte), rupturing the walls of the archegonium in its growth. Fruit (sporophyte) usually forming a pedicel, the base of which is imbedded in the vaginule; upper part of the archegonium, carried up by the elongation of the pedicel, forming the calyptra, which in most mosses covers and protects the sporogonium while it is developing. Capsule (sporogonium) usually with a central axis (endothecium) forming the columella, around which the spore-sac (archesporium) is developed, usually separated from the walls (amphithecium) by air-spaces and chlorophyl-bearing tissue. Capsule dehiscent regularly by a lid or slits, or indehiscent (cleistocarpous); when dehiscent frequently developing specialized appendages around the mouth, constituting the peristome, which serves in the dissemination of the spores. All the species of Bermuda are native. Their spores were presumably brought on the wind. There are two orders represented in the Bermuda Flora.

Capsule borne on a pseudopodium; spore-sac arching over the columella. I. Sphagnales.
Capsule borne on a more or less elongated pedicel; spore-sac cylindric, surrounding the columella and perforated by it at the base and apex. II. Bryales.

Order 1. SPHAGNÀLES.

Protonema normally thalloid, the gametophyte developing from its edge; the latter at first branchless, but branches soon developing, usually in fascicles of 3 or more. Archegonia borne on more or less differentiated branches; antheridia on normal or slightly differentiated ones. Calyptra rent irregularly by the ripening capsule, leaving at its base an inconspicuous sheath. Capsule nearly sessile, globose, on a very short stalk with a bulbous base; capsule at maturity raised upon a prolongation of the fruiting branch (pseudopodium), dehiscent by a small apical lid; peristome none; endothecium giving rise only to the columella, upon whose broad rounded top rests the dome-shaped spore-sac. Spores tetrahedral. The order consists of but one family.

Family 1. SPHAGNÀCEAE Nees.

PEAT-MOSS FAMILY.

Characters the same as those of the order. Only the following genus.

1. SPHÀGNUM [Dill.] L.

Large erect mosses mostly of bogs, and wet mountain summits. Plants developing apically. Branches usually in fascicles disposed spirally about the stem, densely crowded together near the apex. Leaves of the stem and branches arranged spirally, composed of a single layer of two kinds of cells. Stem-leaves more or less differentiated in shape and size, less closely disposed than the branch-leaves. Plants monoicous or dioicous, the antheridial and archegonial branches always distinct. Antheridia long-pedicellate, globose to oval, borne each at the side of a perigonial leaf, opening at the summit when mature and releasing vesicles containing each a spermatozoid; paraphyses lacking. Archegonial branches single or rarely two together, bearing at the apex without paraphyses 1–5 archegonia, of which after fertilization only one develops into a capsule. Perichaetial leaves much larger than and usually otherwise differentiated from the other leaves, enclosing the capsule until its maturity; capsule globose, dark-brown to black, with small lid, without annulus or peristome; spores tetrahedral, disseminated by explosive discharge from the capsule. [Greek, in reference to the spongy nature of the plants.] About 250 species, of wide geographic distribution. Type species: *Sphagnum palustre* L.

Stem-leaves large, long lingulate; branch-leaves oval to ovate. 1. *S. magellanicum*.
Stem-leaves small, triangular-ovate; branch-leaves long lanceolate or linear lanceolate 2. *S. cuspidatum*



1. **Sphagnum magellánicum** Brid. MAGELLAN PEAT-MOSS. (Fig. 470.) Plants compact to robust, bright-green or variously tinged with brown, red-brown or more commonly pink to purple-red. Stems up to 6 inches high; stem-leaves large, long-lingulate to lingulate-spatulate, the border denticulate, hyaline only at the immediate apex; branches frequently short, in fascicles of 4 or 5, 2 spreading; branch-leaves imbricate or spreading, broadly ovate, the border denticulate especially toward the apex. Dioicous. Antheridial branches and leaves hardly differentiated, the latter slightly more highly colored than the others (red or brown). Fruiting branches erect; capsule dark-brown; spores brown, minutely papillose. [*Sphagnum medium* Limpr.]

In Devonshire Marsh, the only station. Labrador southward to Alabama and Florida; Michigan; Minnesota; California; Vancouver Island to Alaska; also in Europe, Asia and South America.

2. **Sphagnum cuspidàtum** Ehrh. CUSPIDATE PEAT-MOSS. (Fig. 471.) Plants delicate, slender and floating or sometimes fairly robust, often up to a foot long, green or yellowish. Stem-leaves small, triangular-ovate, strongly concave, slightly toothed but not lacerate at the apex; the border strong, considerably broadened below, its cell-walls pitted; hyaline cells narrow, short above, divided; branches mostly in fascicles of 3 or 4, 2 spreading, the other one or two drooping, not closely applied to and concealing the stem; branch-leaves slightly or not at all undulate when dry, long-lanceolate, involute, the apex toothed, the border normally entire, of 2–4 rows of narrow cells, serrulate on the margin by the projecting ends of the narrow border cells. Dioicous. Antheridia in catkins on spreading branches; antheridial leaves brown, slightly smaller than the normal branch-leaves, relatively broader and with broader areolation. Fruiting branches erect, sometimes very long, capsule brown; spores brown, roughened.

In Pembroke and Devonshire marshes. Newfoundland to Georgia; also in Europe and Asia. Only the form with serrulate leaves is known in the Bermuda flora.



Order 2. BRYÀLES.

Protonema usually filamentous; calyptra apical; pedicel more or less elongated, apical or lateral; capsule generally with a well-developed lid; peristome present or absent, neck usually with stomata.

Capsule with a simple peristome.
- A. Teeth 8 or 16, bifid or entire.
  - Leaf-blade of one layer of cells. Fam. 1. DICRANACEAE.
  - Leaf-blade of several layers of unlike cells. Fam. 2. LEUCOBRYACEAE.
  - Leaf with duplicate basal blades. Fam. 3. FISSIDENTACEAE.
  - Leaf with basal cells large and empty. Fam. 4. CALYMPERACEAE.
- B. Teeth lacking, 16 or 32, usually with a basal membrane. Fam. 5. POTTIACEAE.

Capsule with a double peristome.
- A. Pedicel terminal.
  - Leaves with large cells, about as long as broad. Fam. 6. FUNARIACEAE.
  - Leaves with cells usually longer than broad. Fam. 7. BRYACEAE.
- B. Pedicel from lateral branches.
  - Leaf-cells smooth, veins 2, ending near apex. Fam. 8. HOOKERIACEAE.
  - Leaf-cells more or less papillose, vein single.
    - Leaves of two sizes, under leaves very small. Fam. 9. RHACOPILACEAE.
    - Leaves of uniform size, clearly papillose. Fam. 10. LESKEACEAE.
  - Leaf-cells smooth, vein single or short and double.
    - Lid short, conic. Fam. 11. HYPNACEAE.
    - Lid long, beaked. Fam. 12. SEMATOPHYLLACEAE.

Family 1. **DICRANÀCEAE** B. S. G.

DICRANUM FAMILY.

Plants perennial, large or small, gregarious or crowded; stems branching dichotomously, usually densely leafy and bearing radicles. Leaves straight or curved, smooth or papillose; vein usually stout and percurrent, sometimes ribbed on the back; basal cells usually pale and rectangular, those of the basal angles often much enlarged and colored; upper cells shorter, the walls often thickened, pitted and sinuous. Pedicel long, erect or curved; capsule erect and symmetric or bent and curved, sometimes furrowed; calyptra cucullate; lid conic, beaked; peristome single, teeth 16, usually bifid. About 48 genera, with some 1460 species widely distributed.

1. **CAMPÝLOPUS** Brid.

Characters of the family. Leaves usually grooved or tubular, subulate and often toothed at apex, sometimes with a paler hair-point. Pedicel usually curved; capsule usually horizontal or nodding; calyptra mostly fringed at base. [Greek, in reference to the curved pedicel.] A tropical genus of about 500 species. Type species: *Bryum flexuosum* L.



1. Campylopus bermudiànus R. S. Williams. BERMUDA CAMPYLOPUS. (Fig. 472.) Plants in dark green, loose tufts, stems about 2½′ high, branching, often with flagellae; leaves often crowded at the apex, mostly spreading all around, lanceolate, grooved above, sharply serrate at the apex and more or less serrulate on the margin; vein broad, percurrent or slightly excurrent, with prominent serrate lamellae 2 or 3 cells high on the back above; alar cells inflated, the cells just above mostly rectangular, pale, broad toward the vein, narrow toward the margin, smaller above, with slightly thickened walls rarely pitted near the vein.

Paget Marsh, under palmetto. Endemic.

Family 2. **LEUCOBRYÀCEAE** C. Muell.

WHITE MOSS FAMILY.

Plants perennial, growing in dense pale green cushions; stems medium to large, branching; leaves crowded, sometimes fragile and breaking off, vein broad filling most of the leaf, blade very narrow, the green cells of the leaf small, in a single central band between several layers of larger hyaline cells. Pedicels erect, terminal; capsule erect or horizontal, regular or irregular; peristome single, teeth 8 or 16; lid beaked; calyptra cucullate. Nine genera and 229 species are known.

1. **LEUCOBRÝUM** Hampe.

Characters of the family. A genus of 121 species, widely distributed in temperate and tropical regions. [Greek, in reference to the pale color of the plants.] The following species typical.



1. Leucobryum glaùcum (L.) Schimp. WHITE MOSS. (Fig. 473.) Plants in compact, pale green cushions; stems branching, seldom more than 2 inches high; leaves crowded, erect-spreading, sometimes curved; base ovate, narrowed to a tubular point, apex acute, minutely denticulate, hyaline blade of the lower part of the leaf about 5 cells wide on either side of the broad vein; pedicel dark red; capsule nodding, strongly curved and furrowed when dry; annulus none; peristome single, teeth 16, papillose, divided to below the middle; lid beaked; spores slightly rough.

On the ground among ferns and palmettos in marshes. Newfoundland to Minnesota, south to Florida and Louisiana; also throughout Europe. [*Bryum glaucum* L.]

Family 3. **FISSIDENTÀCEAE** Bruch & Schimp.

FISSIDENS FAMILY.

Small plants, usually growing in moist shady places, on earth or stones; stems erect or decumbent, simple or sparingly branched; leaves few, always two-ranked and conduplicate, clasping at base, with a single vein and with an apical and dorsal prolongation especially in the upper leaves. Pedicels terminal or on lateral buds; capsules ovoid or cylindric,

straight or curved; calyptra cucullate; lid conic often beaked, peristome red, single, of 16 bifid teeth, often thickened at joints and either papillose or spiral at apex. A large family of 4 genera, containing some 570 species, abundant in temperate and tropical regions of which three are known to occur in Bermuda.

1. **FÍSSIDENS** Hedw.

Characters the same as the family. [Latin, in reference to the split teeth of the peristome.] Type species: *Hypnum bryoides* L.

Fruit nearly basal; leaf-margins serrate. 1. *F. taxifolius.*
Fruit terminal; leaf-margins entire.
  Leaves bordered throughout, cells smooth. 2. *F. minutulus.*
  Leaves bordered only on duplicate blade of uppermost leaves, cells papillose. 3. *F. Garberi.*

1. Fissidens taxifòlius (L.) Hedw. YEW-LEAVED FISSIDENS. (Fig. 474.) Plants seldom more than ½′ high, usually in dense cushions; stems erect, branching from the base; leaves 7–10 pairs, oblong-lingulate, broadly pointed, apiculate with vein percurrent, margins minutely serrate, one row of cells often paler, but not bordered; cells inflated, mamillose; pedicel red, from lateral buds near the base of the stem; capsule at length nodding; lid beaked; peristome red, teeth papillose.

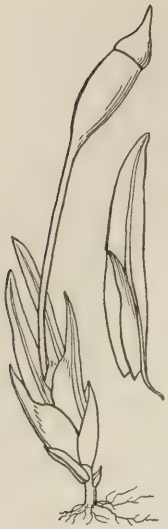
On the ground in woods near Walsingham Caves, only known sterile. Not uncommon in temperate regions of North America. Also Europe, Asia and Africa.





2. Fissidens minùtulus Sull. SMALL FISSIDENS. (Fig. 475.) Plants minute, about 2″ high, growing usually on stones in caves and gulleys. Stems erect or decumbent branching by basal innovations; leaves 5–8 pairs, increasing in size upward, oblong-lanceolate, acute; vein ending in the apex; margins bordered by 1–2 rows of narrower longer cells generally disappearing below the minutely toothed apex; cells small, smooth. Pedicel short, terminal, becoming erect; capsule minute ovoid to cylindric; lid beaked; teeth spirally thickened and papillose at apex.

On rocks in shaded gulleys and caves; also in North America and Europe.



3. **Fissidens Gàrberi** Lesq. & James. GARBER'S FISSIDENS. (Fig. 476.) Plants very small, about 1″ high, dark green; stems erect or decumbent; leaves 5–6 pairs, but on the sterile stems occasionally 15–16 pairs, lanceolate, acuminate, upper the longest; vein ending in the apex or percurrent; margins not bordered except at the base of the uppermost pair of leaves; cells small, dense, papillose. Pedicel terminal, short, erect; capsule small, erect; lid conic-beaked; peristome red, spirally thickened at apex.

On moist rocks in shade, usually in gulleys or caves; also in the southern United States and the Bahamas, usually on limestone rocks. One of the most puzzling and variable of the smaller species of this genus probably including several other closely allied described species from Cuba, Porto Rico, Haiti, San Domingo, Jamaica, Guadaloupe and Trinidad.

Family 4. **CALYMPERÀCEAE** C. Muell.

CALYMPERES FAMILY.

Plants usually growing in dense dark green cushions on trees in shade, seldom fruiting but often propagating by brood-bodies, growing in clusters from the tips of specially modified leaves. Stems mostly erect and sparingly branched. Leaves often crowded at the ends of the branches, erect or spreading, broad and clasping at base, lanceolate or contracted into a spathulate apex; margins entire or serrate often with a band of elongated submarginal cells; basal cells clear, smooth, upper cells small, round, often papillose. Pedicel terminal, erect usually exserted; calyptra cucullate or campanulate; lid long-beaked; peristome single of 16 short teeth. A family of mostly tropical mosses, containing 2 genera and about 313 species.

1. **SYRRHÓPODON** Schwaegr.

Differing from the characters of the family only in the often specially modified margins of the leaves which are either thickened or double; the calyptra is conic-campanulate. [Greek, in reference to the united teeth of the peristome.] Mostly tropical or subtropical species of which 215 have been described. Type species: *Calymperes Gardneri* Hook.

1. Syrrhopodon floridànus Sull. FLORIDA SYRRHOPODON. (Fig. 477.) Plants about 1′ high, forming large dense, dark green cushions; stems simple or branching, rooting at base, with crowded leaves, which are curled and twisted when dry, spreading when moist, with a conspicuous broad white base and narrower, dense, dark green apex; margins double and serrate; basal cells hyaline, upper cells and back of vein densely papillose, sometimes bearing dense clusters of brood-bodies, by which this species propagates.

At base of palmetto in marshes. Southern United States and Cuba.



Family 5. **POTTIÀCEAE** Bruch & Schimp.

POTTIA FAMILY.

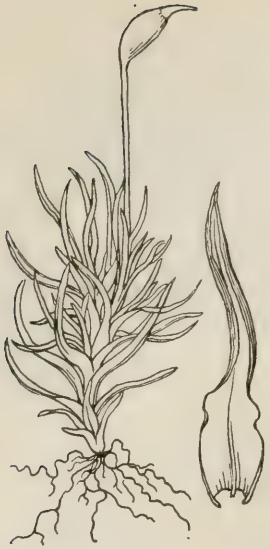
Plants small, or large, growing in more or less crowded cushions; stems usually erect, short and simple or branching, not tomentose; leaves crowded, spreading often twisted when dry, of various shapes; vein single, percurrent or excurrent into an awn; cells of the basal part of the leaf often larger and clearer than those of the apical, which are usually denser and often papillose. Pedicel sometimes very short, mostly elongate and erect; capsule erect, usually straight, seldom inclined; calyptra cucullate; lid conic and beaked; peristome single, rarely lacking, occasionally with a deep basal membrane, teeth 16 or 32, often papillose, sometimes bifid and spirally twisted. A large family of 46 genera and 396 species.

Leaves much curled and twisted when dry, margins incurved; peristome short, straight or lacking.
- Leaf-margins entire; teeth 16, entire or irregularly divided. 1. *Weisia.*
- Leaf-margins entire; teeth 16, split or bifid. 2. *Trichostomum.*

Leaves only slightly curved or bent when dry.
- A. Peristome short.
  - Leaf-margins toothed at base. 3. *Eucladium.*
  - Leaf-margins finely crenulate, toothed above. 4. *Gymnostomum.*
- B. Peristome none. 5. *Hymenostylium.*
- C. Peristome long, twisted. 6. *Tortula.*

1. **WEÌSIA** Hedw.

Plants small, crowded; stems erect, with branches; leaves much curled and twisted when dry, mostly subulate-lanceolate with incurved margins; vein ending in the sharp apex; cells rectangular and clear at base, rounded and small above, papillose on both sides above. Seta erect, slender; capsule erect, ovoid or cylindric, ribbed when dry; peristome single, inserted below the mouth; teeth 16, irregular and papillose, or rarely short and rudimentary. [Named for F. W. Weis.] A small genus widely distributed in temperate regions. Type species: *Bryum viridulum* L.

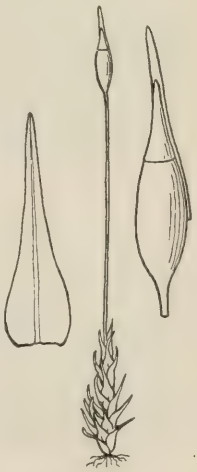


1. **Weisia viridula** (L.) Hedw. BRIGHT-GREEN WEISIA. (Fig. 478.) Plants growing in more or less crowded bright green tufts, up to 6″ high; stems erect and simple or branched; branches short; leaves crowded at the ends of the branches, spreading, from an erect base, points curled and twisted when dry, base broader, apex with inrolled, entire margins, forming a long sharp point; vein stout, excurrent into a short mucronate apex. Monoicous; pedicel erect, slender, yellow or brown; capsule small ovoid to cylindric, erect and symmetric or slightly inclined; often dark brown and shining; calyptra cucullate; lid beaked; annulus narrow, persistent; peristome inserted below the mouth; teeth 16, short, papillose, often irregularly split or perforate or short and undeveloped; spores rough, brown, maturing in spring.

On rocks at one station near Walsingham. A common and variable species of wide distribution in temperate regions.

2. **TRICHÒSTOMUM** Hedw.

Plants medium-sized, usually growing crowded; stems erect, simple or branched; leaves curled and twisted when dry, larger at base, with a narrow sharp apex; margins flat or inrolled, entire; vein single, usually percurrent; basal cells oblong and clear, upper cells denser, small and papillose on both sides. Pedicel erect, elongate; capsule erect, cylindric; peristome single; teeth 16, either entire or divided to base, usually papillose; lid conic-beaked; calyptra cucullate. [Greek, in reference to the narrow teeth.] Widely distributed in various temperate and tropical regions. Type species: *Weisia cylindrica* Bruch.



1. **Trichostomum bermudànum** Mitt. BERMUDA TRICHOSTOMUM. (Fig. 479.) Plants in crowded bright green or yellowish-green patches; stems up to 9″ high, usually simple; leaves crowded, curled and twisted when dry, base erect clasping, points narrower with the vein, smooth and excurrent into a mucronate apex; margins entire, incurved above; basal cells lax with longer cells on the margins extending up the blade to the papillose cells of the upper part. Pedicel yellow, erect and twisted; capsule erect, cylindric, lid conic-beaked; calyptra cucullate; peristome single, of 16 slender, papillose, bifid teeth; often disappearing and leaving only a ragged membrane; spores large, rough, brown, maturing in spring.

Very common on walls, rocks and on the ground. Endemic. Closely related to *T. jamaicense* Mitt.

3. **EUCLÀDIUM** Br. & Sch.

Plants perennial, in dense mats, forming calcareous tufa; stems branching erect and crowded; leaves small, spreading, broadest at base, long-pointed; vein stout, percurrent; basal cells larger and clearer than the upper papillose cells. Pedicel erect, exserted; capsule small, ovoid or cylindric; lid beaked; calyptra cucullate; peristome single; teeth 16, perforate or split. [Greek, referring to the beautiful branches.] A genus of 3 species. Type species: *Bryum verticillatum* L.

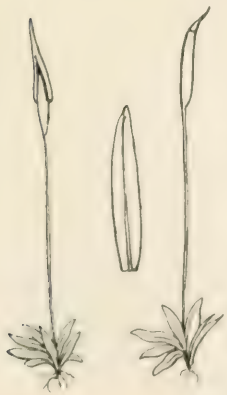


1. Eucladium verticillàtum Br. & Sch. WHORLED-LEAVED EUCLADIUM. (Fig. 480.) Plants growing in dense bright green cushions, pale brown below; stems up to 9″ high, slender and brittle, rooting at intervals, and branching repeatedly; leaves small, in clusters at the tops of the branches, base broad, with a few sharp teeth, apex narrower, margins above flat, entire; vein stout, ending in the rather blunt apex; basal cells oblong, upper round and small, papillose. Pedicel erect, slender; capsule ovoid-cylindric, erect or horizontal; calyptra cucullate; lid beaked; annulus narrow; teeth 16, more or less perforate along the median line.

On wet limestone in caves, often dripping with moisture and hardened with lime deposits. Widely distributed in North America, Europe and Asia.

4. **GYROWEÌSIA** Schimp.

Small plants, usually growing on limestone rocks; stems short with a few short lanceolate or lingulate leaves, usually blunt, base broader hyaline, vein single, ending below the apex; upper cells round and dense, often swollen. Usually dioicous. Pedicel erect, short and twisted; capsule small, ovoid or cylindric; peristome more or less developed, usually falling with the lid; annulus present; lid conic-apiculate or beaked. [Greek, in reference to the twisted annulus.] A genus of about 14 species, found in subtropical regions, from Florida to Cuba, Jamaica and Porto Rico. Type species: *Gymnostomum tenue* Schrad.



1. Gyroweisia Bárbula (Schwaeger.) Paris. BLACK-FRUITED GYROWEISIA. (Fig. 481.) Plants seldom more than 3″ high, dark green, or almost black, stemless, with a rosette of a few basal leaves, which are linear-oblong and twisted when dry; vein ending below the blunt apex; margins finely crenulate toothed, inrolled when dry; basal cells oblong, lax and clear; upper cells round and swollen. Pedicel short, erect; capsules narrowly cylindric, straight or slightly curved, mouth narrow; lid conic, beaked; annulus present; calyptra cucullate; peristome usually falling with the lid; teeth 16, bifid, and papillose; spores smooth, minute, maturing in March and April. [*Tortula melanocarpa* Mitt. of Challenger Report; *Gymnostomum Barbula* Schwaegr.]

On limestone usually associated with *Tortula* [illegible]. Florida; Cuba; Jamaica; Porto Rico. South America.

5. **HYMENOSTÝLIUM** Brid.

Plants in dense crowded tufts; stems tall, slender and branching; leaves crowded small, lanceolate-acuminate; vein single, ending below the apex; cells smooth or papillose; pedicel erect, elongate; capsule erect, ovoid and shining; peristome lacking; lid with a long beak; calyptra cucullate. [Greek, referring to the membrane covering the mouth of capsule.] A genus of 17 species widely distributed on limestone rocks, mostly in temperate regions. Type species: *Hymenostylium xanthrocarpum* (Hook.) Brid.



1. Hymenostylium curviróstre (Ehrh.) Lindb. Curved-beaked Hymenostylium. (Fig. 482.) Plants in pale green calcareous cushions; stems up to 1′ high, slender and leafy branches short; leaves crowded, recurved and twisted when dry, spreading when moist, lanceolate-acuminate, short; vein stout, smooth, ending below the apex; margins entire, often slightly recurved at base; basal cells rectangular, clearer and larger than the papillose upper cells. Pedicel terminal, becoming lateral by innovations, more or less persistent; capsules ovoid-pyriform, erect, with a long-beaked lid which is more or less persistent; annulus narrow; peristome none, mouth closed by a membrane; spores large, maturing in summer. [*Pottia curvirostris* Ehrh.]

Thus far only found sterile under dripping rocks in caves forming lime-encrusted cushions. Widely distributed in temperate regions of North America and Europe, always on calcareous rocks.

6. **TÓRTULA** Hedw.

Plants of various sizes, sometimes large and stout; usually growing on the ground or on rocks in dense cushions; stems usually simple, rarely branched; with the leaves crowded at the top of the stem, usually spreading when dry, or twisted, mostly broader above the middle, usually entire, with a single vein, sometimes excurrent into an awn, with the basal cells long and clear and the upper small and dense, sometimes papillose. Pedicel erect, elongate; capsule erect, cylindric; lid usually long-beaked; calyptra cucullate; peristome single, usually twisted; teeth 16 or 32; slender, papillose; spores small. [Latin, with reference to the twisted peristome.] A large genus of 186 species widely distributed in all parts of the world. Type species: *Bryum murale* L.



1. Tortula agrària Sw. Common Tortula. (Fig. 483.) Plants up to 9″ high, almost stemless, forming a rosette of basal leaves, not much curled or twisted when dry; widest above the middle, base oblong with clear, long cells; apex acute, cells square, smooth, vein stout ending in a mucronate point. Pedicel erect; capsule cylindric, ribbed when dry; annulus present; lid long-conic-beaked, red at base; peristome red, papillose twisted; teeth 16, long and slender, bifid or trifid with a short basal membrane; calyptra cucullate; spores smooth, small, maturing in spring. [*Barbula agraria* Hedw.]

Common on limestone from Florida and Texas to Mexico and from the Bahamas through the West Indies to South America.

Family 6. **FUNARIÀCEAE** C. Mueller.

FUNARIA FAMILY.

Plants usually annual or ephemeral, seldom biennial; sometimes minute. Stems short, erect and seldom branched; leaves small and narrow or large and broad, margins entire or toothed; vein present or rarely absent. Pedicel sometimes short and immersed or long and exserted; capsule erect or inclined, symmetric or unsymmetric, ovoid or pyriform; annulus often large and conspicuous or undeveloped; calyptra cucullate, often inflated and oblique, rarely lobed or papillose; peristome absent, rudimentary or double, teeth straight or oblique. A small family of wide distribution, including about 12 genera with some 244 species.

1. **FUNÀRIA** Schreb.

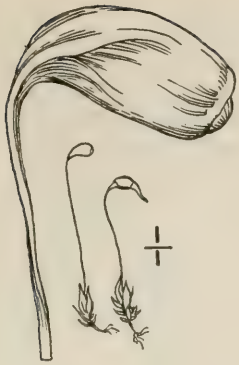
Plants usually scattered, rarely crowded; stems short, simple; leaves usually crowded at the summit, usually broadest above the base, entire or serrate; vein ending below the apex or percurrent or excurrent; pedicel exserted, elongated; capsules erect or nodding, often pear-shaped; lid flat or apiculate; calyptra much inflated at base, beaked; peristome single, double or rarely lacking. [Latin, in reference to the twisted pedicels.] A large genus of widely distributed cosmopolitan species. Type species: *Mnium hygrometricum* L.

Mouth of the capsule oblique; leaves serrate. 1. *F. hygrometrica.*
Mouth of the capsule small; leaves nearly entire. 2. *F. flavicans.*

1. Funaria hygrométrica (L.) Sibth. CORD MOSS. (Fig. 484.) Plants up to 1½′ high, bright yellowish-green turning brown; stems short, simple; leaves few, erect, appressed around the base of the pedicel, broad and concave, acute or acuminate; the vein ending in the apex, margins entire or faintly toothed; cells clear, smooth, oblong below, shorter and hexagonal above. Pedicel pale, twisted, variable in length; capsule horizontal or nodding, ribbed when dry; mouth oblique; lid bordered with a red rim; annulus large falling with the lid; peristome double, oblique, the teeth with apical appendages; calyptra large, inflated at base; spores rough, ripening early in spring. [*Mnium hygrometricum* L.]

On burnt ground and on rocks, not frequent. Widely distributed in temperate and tropical regions.





2. **Funaria flávicans** Rich. PALE-GREEN FUNARIA. (Fig. 485.) A smaller plant than the last, up to 6″ high, differing in the fewer leaves, which are entire, the vein ending in a short subulate tip; the pedicel shorter, the capsule more symmetric, its mouth not oblique; spores a little larger, maturing in March.

On rocks, not common. Southern United States.

Family 7. **BRYÀCEAE** C. Mueller.

BRYUM FAMILY.

Plants usually growing in dense cushions, rarely scattered; stems erect, simple or branching near the apex, often slender; leaves scattered or crowded at the summit, variable in shape, from oval to lanceolate, often acuminate and subulate; vein single; margins entire or toothed; cells smooth, generally hexagonal, sometimes narrower on the border and rectangular at the base. Pedicel terminal, erect; capsule erect or nodding, generally symmetric with a well-developed neck; calyptra cucullate; lid conic-apiculate, peristome usually double, rarely single or lacking. A large family, widely distributed in various regions of the globe, composed of 16 genera with over 950 species most abundant in temperate, alpine and arctic regions. The specimens from Bermuda are few and in poor condition.

1. **BRŸUM** L.

Characters of the family; capsules never erect, generally pear-shaped; annulus large and well-developed; peristome always double, the inner more or less developed, with or without cilia. [Greek, meaning a moss.] A large genus of over 600 species, usually growing on earth or rocks, seldom on trees or rotten wood, most abundant in cold and temperate regions. Type species: *Bryum argenteum* L.

Leaves bordered, vein excurrent into a subulate tip. 1. *B. capillare.*
Leaves not bordered, minutely toothed, gemmiferous, vein ending in the acute apex. 2. *B. Crügeri.*



1. Bryum capillàre L. Hair-like Bryum. (Fig. 486.) Plants up to 1¾′ high in rather dense, dark green cushions; stems short, sparingly branched; leaves crowded in a rosette at the apex, curled and twisted when dry, ovate to lanceolate-acuminate, margins bordered by 1–2 rows of narrower cells, entire or slightly toothed near apex; vein ending in the point or excurrent into a mucronate tip; upper cells hexagonal, basal oblong, smooth. Pedicel long, red, bent at base, paler and twisted above; capsule elongated, nodding; neck distinct; lid small, apiculate; annulus large; peristome brown; teeth paler and papillose above; endostome with a basal membrane and appendiculate cilia; spores ripe in spring.

On rocks and roots of ferns in marshes, usually sterile, and propagating by gemmae. Cosmopolitan and variable.



2. Bryum Crúgeri Hpe. Crüger's Bryum. (Fig. 487.) Plants forming loose yellowish green cushions; stems simple, up to 8″ high; leaves not crowded, shining, lanceolate, acute; vein percurrent, ending in the cuspidate apex; margins plane, not bordered, slightly toothed toward the apex; cells long hexagonal, basal and alar, rectangular, not decurrent. The Bermuda specimens propagate by gemmae and the fruit has not been found.

On stones in Devonshire Marsh. Ranging from Cuba to Trinidad and South America but rarely fruiting.

Bryum dichótomum Hedw., of the Challenger report is a doubtful species for Bermuda; specimens cannot be found in the Mitten Herbarium and no definite locality was recorded.

Family 8. **HOOKERIÀCEAE** C. Mueller.

Hookeria Family.

Plants large or small, usually with decumbent rooting stems; leaves many-ranked, symmetric or unequal in shape; veinless or usually with two veins; cells smooth or papillose, not different at basal angles. Pedicel erect, smooth or rough; capsule mostly horizontal; calyptra small, usually lobed; lid conic-beaked, peristome double, endostome usually without cilia. A large family of tropical mosses numbering over 300 species grouped in 25 genera, of which only one is represented in Bermuda.

1. **CYCLODÌCTYON** Mitt.

Plants very pale and hyaline, leaves 2-veined, cells very large and clear. [Greek, referring to the large cells of the leaf.] Sixty-five species have been described, all American. Type species: *Hookeria laete-virens* Hook. & Tayl.



1. Cyclodictyon várians (Sull.) Broth. PALE CYCLODICTYON. (Fig. 488.) Plants perennial, about 8″ high; stems decumbent and rooting; branches short, erect, irregular; leaves pale green or yellow, crowded and flattened in several ranks the lateral ones longer and broader than the upper ones, all obscurely toothed with a narrow border of one row of cells, the veins narrow and ending below the acuminate tip; cells lax and clear. Pedicel smooth, erect; capsule nodding, ovoid-cylindric; lid conic-apiculate; annulus large, falling with the lid; peristome double; teeth red, striate with a median furrow; endostome yellow with a short basal membrane and 16 keeled segments, cilia none; spores green, smooth, maturing in March and April. [*Hookeria varians* Sull.]

On damp rocks in shade, usually in caves. Florida to Guadeloupe.

Family 9. **RHACOPILÀCEAE** Brotherus.

HAIRY-CAP FAMILY.

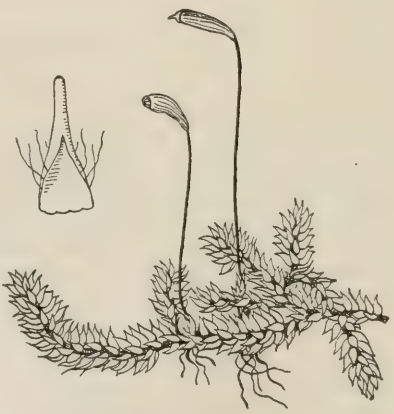
Stems decumbent, usually tomentose and branching; leaves crowded and flattened in 2 ranks, the under leaves much smaller and different in shape from the lateral ones; vein single, cells hexagonal smooth or slightly papillose. Pedicel erect; capsule ribbed when dry; lid beaked; calyptra cucullate, hairy; annulus present, peristome double. A family of one genus only and 39 tropical or subtropical species.

1. **RHACOPÌLUM** Beauv.

Characters the same as those of the family, the following species typical. [Latin, in reference to the hairy calyptra.]

1. Rhacopilum tomentòsum (Sw.) Brid. TOMENTOSE HAIRY-CAP. (Fig. 489.) Plants seldom more than 1′ high, dark green, perennial; stems decumbent irregularly branched, densely matted with brown hairs; lateral leaves somewhat unequal at base, sharply toothed with the vein ending in a slender awn, cells almost smooth; under leaves narrower and longer-pointed. Pedicel stout, erect; capsule horizontal, curved and strongly ribbed when dry; teeth pale and papillose at apex; inner segments keeled and split; cilia 3; spores small, smooth, maturing in summer. [*Hypnum tomentosum* Sw.]

Growing on rocks in shade, in caves and on cliffs. Also in Louisiana and ranging through the West Indies to South America.



Family 10. **LESKEÀCEAE** Reichenbach.

LESKEA FAMILY.

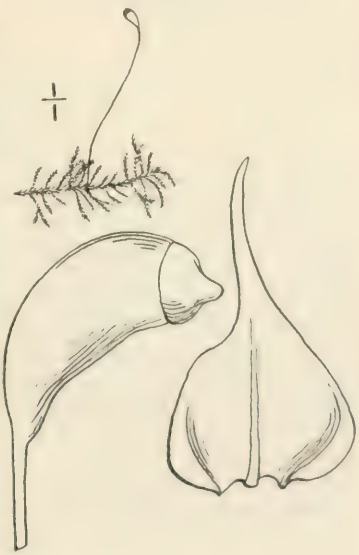
Plants small or large; stems creeping and branching, somewhat irregularly or regularly pinnate; branches short, usually slender and crowded with small leaves; vein single, cells usually papillose on one or both surfaces; branch leaves smaller than the stem leaves rudimentary leaves present. Pedicel erect or inclined; calyptra cucullate; lid conic or beaked; annulus usually present; peristome double, inner sometimes shorter and imperfect. About 23 genera containing some 333 species.

Leaves papillose only on the back. 1. *Haplocladium.*
Leaves papillose on both surfaces. 2. *Thuidium.*

1. **HAPLOCLÀDIUM** C. Müll.

Branches slender, simple, not pinnately divided; leaves papillose only on the back, those at base of pedicel, erect, longer and paler. [Greek, referring to the simple branches.] A genus of 43 species, natives of America and Eastern Asia. Type species: *Haplocladium macropilum* C. Muell.

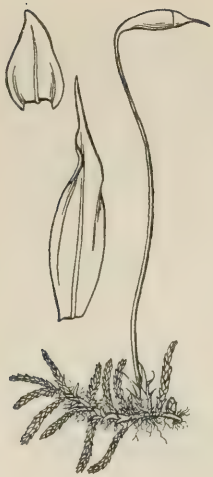
1. Haplocladium microphỳllum (Sw.) Broth. SMALL-LEAVED HAPLOCLADIUM. (Fig. 490.) Plants slender, perennial, dark green or yellow; stems creeping and rooting, sometimes quite slender and up to several inches long; branches short and simple, erect; leaves crowded, spreading or secund, ovate-acuminate; vein excurrent into a long tip; margins minutely toothed; cells small, square or oblong, papillose only on the back; leaves at base of pedicel longer and paler, erect. Seta long and slender, erect; capsule horizontal and curved; annulus falling with the conic lid; peristome double; inner peristome with keeled segments and 3 cilia; spores smooth, maturing in summer. [*Hypnum microphyllum* Sw.]



On rocks in shade; not common fruiting. Also found in various parts of the United States, the West Indies and Mexico.

2. **THUÍDIUM** Br. & Sch.

Plants minute or taller and much branched; stems creeping or erect; branches rarely simple, more often regularly pinnate or bipinnate; leaves ovate, acute or acuminate; vein single, stout, ending in or below the tip; cells small, dense, papillose on both surfaces. Pedicel erect; capsule horizontal or curved; calyptra cucullate; lid beaked; annulus compound; peristome double. [Diminutive of *Thuja.*] A large genus, widely distributed in temperate regions, with some 63 species in America, the following typical.



1. Thuidium minútulum (Hedw.) Br. & Sch. MINUTE THUIDIUM. (Fig. 491.) Stems up to 1′ long, very slender and creeping, branches short and simple, somewhat irregular or pinnate; leaves minute, those of the stems acuminate, sharply pointed, branch leaves shorter, acute, more crowded; vein ending below the apex, smooth; cells dense, obscure and papillose on both surfaces; margins and apex with projecting multipapillate cells. Pedicel erect; capsule horizontal, cylindric or curved; lid long-beaked; annulus large; inner peristome with cilia; spores small, maturing in autumn. [*Hypnum minutulum* Hedw.]

On rotten wood in shade, very rare in Bermuda; not uncommon in United States and Canada.

Family 11. **HYPNÀCEAE** Hampe.

HYPNUM FAMILY.

Plants growing in loose or dense tufts, seldom floating; stems usually decumbent and rooting, sometimes erect; branches regularly pinnate or irregular; leaves straight or curved, erect, spreading or secund, usually symmetric; vein either lacking, single or double; cells mostly much longer than wide, smooth or papillose, those of the basal angles often different in shape and size. Pedicel more or less elongated and exserted; capsule mostly horizontal, often curved and unsymmetric; peristome double; segments keeled; cilia usually present; spores small. A large family, widely distributed in all parts of the globe. Composed of about 37 genera with over 960 species.

Vein of the leaf long, single; lid of the capsule conic, blunt. 1. *Amblystegium.*
Vein of the leaf short and double or none; lid of the capsule sharp-pointed. 2. *Isopterygium.*

1. **AMBLYSTÉGIUM** Bruch & Schimp.

Plants usually growing in moist localities; stems irregularly branched; branches slender; leaves symmetric, spreading; vein single; cells smooth, not much longer than wide. Pedicel erect, smooth; capsule usually curved; calyptra cucullate; lid conic; annulus present; peristome double. [Greek, referring to the blunt lid.] A genus of 47 species, widely distributed in America and Europe. Type species: *Hypnum riparium* L.

1. Amblystegium várium (Hedw.) Lindb. VARIABLE AMBLYSTEGIUM. (Fig. 492.) Plants growing in loose thin mats up to 1′ high; stems prostrate and branching; branches short and slender, erect and simple; leaves small, spreading, ovate-acuminate, margins entire or rarely obscurely toothed; vein stout, ending in the tip; cells 2–4 times longer than wide, those of the basal angles square or oblong. Pedicel erect; capsule curved and contracted below the mouth when dry; inner peristome finely papillose with keeled segments and cilia; spores small, slightly roughened, maturing in spring. [*Leskea varia* Hedw.]

On shaded rocks near caves. Very common and widely distributed in America and Europe.



2. ISOPTERÝGIUM Mitt.

Plants usually rather small; stems decumbent and irregularly branched; leaves somewhat flattened, small and crowded, usually symmetric; vein short and double or none; pedicel erect; capsule erect or horizontal; lid conic or apiculate; calyptra cucullate; peristome double. [Greek, referring to the symmetric leaves.] A large genus of 168 species, mostly American, in temperate and tropical regions. Type species: *Isopterygium planissimum* Mitt.



1. Isopterygium micans (Sw.) Mitt. GLOSSY ISOPTERYGIUM. (Fig. 493.) Plants up to 8″ high in dense glossy yellowish green mats; stems slender, decumbent; branches simple or divided; leaves crowded, spreading, small, ovate-acuminate, faintly serrate, veins short, double, obscure; cells long and narrow, a few at basal angles distinctly shorter and broader. Pedicel erect, slender; capsule horizontal, curved and contracted below the mouth when dry; lid conic, slightly apiculate, cilia more or less developed, spores small. [*Hypnum micans* Sw.]

On roots of ferns and on rotten wood in marshes. Found in various parts of the eastern United States, also in Cuba and Jamaica.

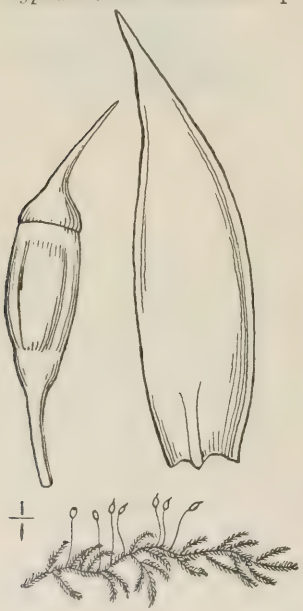
Family 12. **SEMATOPHYLLÀCEAE** Brotherus.

SEMATOPHYLLUM FAMILY.

Plants usually forming dense tufts; stems creeping; branches erect, irregular and unequal, sometimes pinnate; leaves small, crowded, often secund; veins short, double or lacking, cells usually much longer than wide; those of the basal angles often larger, inflated or square. Pedicel long, erect; capsule usually horizontal without an annulus; calyptra cucullate; lid usually with a long slender beak; peristome double. Twelve genera and 448 species widely distributed in tropical regions.

1. **SEMATOPHÝLLUM** Mitt.

Characters of the family. [Greek, in reference to the pointed leaves.] A large genus, 315 species known mostly from tropical America. Type species: *Hypnum substrumulosum* Hpe.



1. Sematophyllum adnàtum (Michx.) E. G. Britton. SEMATOPHYLLUM. (Fig. 494.) Plants small, yellowish-green, glossy; stems short, seldom more than 2″ long, creeping; branches erect, somewhat curved at apex; leaves crowded, spreading or secund, acuminate; margins recurved, entire or faintly serrulate; veins short or none; cells spindle-shaped, those of the basal angles enlarged and hyaline. Pedicel short; capsule very small, ovoid, contracted below the mouth when dry; lid long-beaked, teeth with deep projections on the inner surface, papillose at apex; spores rough, small, maturing in summer. [*Leskea adnata* Michx.]

On rotten wood in shade. Virginia to Florida.

Class 2. **HEPÀTICAE.**

LIVERWORTS.

CONTRIBUTED BY ALEXANDER W. EVANS.

Terrestrial, epiphytic, or rarely aquatic plants, showing a distinct alternation of generations, the gametophyte existing as an independent individual, the very different sporophyte partially or wholly parasitic on the gametophyte. Gametophyte dorsiventral, consisting of a thallus or more or less differentiated into stem and leaves, attached to the substratum by means of rhizoids (true roots none), growing by means of an apical cell. Sexual organs borne

on the upper surface of the gametophyte or terminal on more or less differentiated branches. Fertilized egg developing directly into the sporophyte, the wall of the venter of the archegonium usually developing into a protective cover, or calyptra, which is not ruptured until the sporophyte is nearly mature. Sporophyte (in all the Bermuda species) differentiated into a capsule (spore-bearing organ), a stalk or a growing region, and a foot (absorbing organ). Capsule consisting of a wall of sterile cells and a spore-sac, the latter sometimes with a median sterile portion (columella), dehiscing irregularly or by means of a lid or of longitudinal splits; spore-sac containing spores only or spores and elaters, the latter consisting of sterile cells often elongated and usually developing spiral bands of thickening on their walls.

Gametophyte a thallus or leafy shoot. Chloroplasts minute, many in each cell. Capsule short, spherical to oval, without a columella, borne on a translucent stalk.

- Gametophyte a thick and fleshy thallus, usually pale and differentiated into distinct tissues, rarely deep green and succulent; green tissue usually with air-spaces. Capsule splitting irregularly or by means of a lid. — Order 1. MARCHANTIALES.
- Gametophyte a delicate thallus or a leafy shoot; tissue differentiation slight; air-spaces not present. Capsule splitting into four longitudinal valves. — Order 2. JUNGERMANNIALES.

Gametophyte a thick and fleshy thallus, dark green and succulent, tissue differentiation slight. Chloroplasts large, borne singly. Capsule long, cylindrical, with a basal growing region, splitting into two longitudinal valves. — Order 3. ANTHOCEROTALES.

Order 1. MARCHANTIÀLES.

Gametophyte a prostrate, strap-shaped, dorsiventral thallus, growing apically, branching dichotomously or from the ventral surface of the median portion, and showing a distinct differentiation into tissues, the green tissue usually with air-spaces. Ventral scales more or less distinct. Rhizoids of two kinds, the one with smooth walls, the other with tuberculate walls. Antheridia in deep depressions on the upper surface of the thallus, sometimes scattered, sometimes grouped together in more or less definite, sessile or stalked, receptacles. Archegonia similar in position but, when borne on stalked receptacles (carpocephala), becoming displaced to the lower surface through intercalary growth. Sporophyte (in all the Bermuda species) differentiated into capsule, stalk, and foot; elaters (or other sterile cells) usually present in the capsule.

Family 1. MARCHANTIÀCEAE.

MARCHANTIA FAMILY.

Thallus (except in *Dumortiera*) with a distinct dorsal layer of air-chambers, communicating with the outside air by means of epidermal pores. Ventral scales in two (or more) longitudinal rows. Antheridia and archegonia borne on more or less definite receptacles; antheridial

receptacles discoid, sessile or stalked; carpocephala discoid, invariably stalked, the stalk sometimes with one or two rhizoid-furrows. Sporophyte differentiated into a capsule, stalk and foot, the capsule forced through the calyptra at maturity by the elongating stalk and dehiscing irregularly or by means of a more or less distinct lid; elaters present in the capsule. Gemmae discoid, present in two genera. About 25 genera and 200 species, widely distributed, especially in warm regions.

Air-chambers and epidermal pores (visible with a lens) present.
  Boundaries of air-chambers indistinct; gemmae never present. 1. *Reboulia.*
  Boundaries of air-chambers distinct; gemmae usually present.
    Gemmae in crescentic conceptacles. 2. *Lunularia.*
    Gemmae in circular conceptacles. 4. *Marchantia.*
Air-chambers and epidermal pores not present. 3. *Dumortiera.*

1. **REBOÙLIA** Raddi.

Thallus branching dichotomously or innovating at the apex and thus appearing jointed. Air-chambers with indistinct boundaries, arranged in several layers and separated from one another by plates of green cells with occasional perforations; epidermal pores bounded by several concentric rows of cells in a single layer, arranged in distinct radiating series, not opening into all the air-chambers. Ventral scales pigmented, divided into a basal portion and one to three appendages. Antheridial receptacle oval to semilunar, sessile, surrounded by a deep groove and by a series of narrow scales. Carpocephalum arising from the extremity of a thallus-branch, hemispherical and bluntly lobed, the long stalk with a single rhizoid-furrow; archegonia five to eight (mostly six or seven), arranged peripherally under the lobes; involucre (around each archegonium or young sporophyte) consisting of two overlapping longitudinal folds with entire margins; pseudoperianth none. Capsule with a very rudimentary lid; cells of wall destitute of ring-like thickenings. [Commemorates Eugène de Reboul, a French botanist.] A monotypic genus.



1. Reboulia hemisphaèrica (L.) Raddi. REBOULIA. (Fig. 495.) Thallus pale green, varying to purple, about 5″ wide and 1′–2′ long, more or less crispate along the margin. Appendages of ventral scales usually two, narrowly lanceolate, composed of elongated cells; inflorescence dioecious or monoecious; antheridial receptacle terminal on a thallus-branch or, in monoecious plants, sometimes borne immediately behind a female receptacle; spores yellow at maturity, about 60 μ in diameter, the surface loosely and irregularly reticulate and finely verruculose; elaters usually with two yellow bands of thickening. [*Marchantia hemisphaerica* L.]

On stone walls and along roadsides. The commonest thalloid liverwort on the island; almost cosmopolitan in its distribution.

2. **LUNULÀRIA** Adans.

Thallus branching dichotomously or innovating at the apex and thus appearing jointed. Air-chambers with distinct boundaries, forming a single layer; green cells in short, simple or branched filaments rising from the floors of the chambers, each filament two or three cells long; epidermal pores bounded by several concentric rows of cells in a single layer, arranged in distinct radiating series, opening into all the air-chambers. Ventral scales delicate and colorless, divided into a basal portion and an appendage. Antheridial receptacle as in *Reboulia*. Carpocephalum arising from the extremity of a thallus-branch, composed of a small central portion, from which four tubular bilabiate involucres, each with one or rarely two archegonia (or sporophytes), diverge horizontally, the long stalk destitute of rhizoid-furrows; pseudoperianth none. Capsule with a distinct lid, the lower portion splitting irregularly into from four to eight teeth; cells of wall destitute of ring-like thickenings. Gemmae discoid, several cells thick in the middle and with two growing points, borne in crescentic conceptacles. [Latin, lunula, a little moon.] A monotypic genus.

1. Lunularia cruciàta (L.) Dumort. LUNULARIA. (Fig. 496.) Thallus light green, becoming brownish yellow with age, not pigmented with purple, mostly 2½″–5″ wide and ½′–1′ long, more or less sinuate along the hyaline margin. Appendages of ventral scales orbicular; inflorescence dioecious; antheridial receptacle terminal on a thallus branch; spores yellowish brown, 15–20 μ in diameter, smooth; elaters usually with two yellowish brown bands of thickening. [*Marchantia cruciata* L.]



On earth at base of walls, Hamilton, *M. A. Howe*. Probably introduced. The species is native to the Mediterranean region but is now naturalized in many parts of the world, especially in gardens and greenhouses. It is rarely fertile but usually produces the characteristic gemmae-conceptacles.

3. **DUMORTIÈRA** Reinw. Bl. & Nees.

Thallus branching dichotomously or innovating at the apex, destitute of air-chambers and epidermal pores. Ventral scales rudimentary and short-lived. Antheridial receptacles oval or circular, terminal on a thallus-branch, surrounded by bristle-like hairs and borne on a very short stalk with two rhizoid-furrows. Carpocephalum arising from the extremity of a thallus-branch, bearing a few scattered bristle-like hairs on the upper surface, convex in the middle and with six to ten blunt lobes, the long stalk with two rhizoid-furrows; archegonia (and sporophytes) borne singly under the lobes, each in a tubular, horizontal involucre extending beyond the lobe and opening by a small apical slit; pseudoperianth none. Capsule with a distinct lid, the lower

portion splitting irregularly into from four to eight teeth; cells of wall with numerous ring-like thickenings. [Commemorates B. C. Dumortier, born 1797, a student of Hepaticae.] Three recognized species, especially of tropical regions, the following typical.



1. Dumortiera hirsùta (Sw.) Reinw. Bl. & Nees. DUMORTIERA. (Fig. 497.) Thallus dark green, mostly 4″–10″ wide and 2′–4′ long, flat, slightly undulate along the margin. Inflorescence dioecious; spores brownish, 22–30 μ in diameter, thickly tuberculate or papillose. [*Marchantia hirsuta* Sw.]

On wet rocks. Originally collected by Moseley. Church Cave, *E. G. Britton, M. A. Howe.* A large species, restricted to very wet localities. Widely distributed in tropical regions; also in western and southern Europe and in the eastern United States.

4. MARCHÁNTIA L.

Thallus branching dichotomously. Air-chambers with distinct boundaries, forming a single layer; green cells in short, simple or branched filaments rising from the floors of the chambers, the filaments mostly three or four cells long; epidermal pores bounded by several superimposed layers, each usually composed of four cells. Ventral scales variable, some divided into a basal portion and an appendage. Inflorescence dioecious. Antheridial receptacle terminal on a thallus-branch, flat or slightly convex, more or less lobed, borne on a somewhat elongated stalk with two rhizoid-furrows. Carpocephalum arising from the extremity of a thallus-branch, composed of a flat or convex central portion from which four to ten lobes radiate, often unsymmetrically, the lobes flat or grooved underneath; stalk with two rhizoid-furrows; archegonia (and sporophytes) in radiating groups between the lobes, each group enclosed by a membranous involucre consisting of two folds with fringed margins; pseudoperianth (around each sporophyte) tubular, membranous, with an open, irregularly cleft mouth. Capsule without a lid, splitting into from four to eight irregular teeth; cells of wall with ring-like thickenings. Gemmae like those of *Lunularia*, borne in circular, cup-like conceptacles. [In honor of Nicolas Marchant, director of the ducal garden at Blois, died 1678.] About 50 species, mostly tropical, the following typical.

1. Marchantia polymórpha L. MARCHANTIA. (Fig. 498.) Thallus deep green, often darker in the median portion, mostly 5″–10″ broad and 2′–8′ long, flat or slightly furrowed, sinuate along the margin. Ventral scales hyaline or pale brownish, in three longitudinal rows on each side of the middle, those of the innermost row with cordate appendages, the others without appendages; antheridial receptacle with eight short rounded lobes; carpocephalum deeply lobed, the lobes mostly nine, cylindrical on account of the revolute margins; spores spherical, 10–12 μ in diameter, yellow, densely and minutely papillose; elaters usually with two yellow bands of thickening; gemmae-conceptacles with a lobed margin, the lobes spinose-ciliate.



On walls and on moist soil. A cosmopolitan species, known in Bermuda from a single collection made by Miss L. DeF. Haynes.

Order 2. JUNGERMANNIÀLES.

Gametophyte a prostrate, strap-shaped, dorsiventral thallus or more or less clearly differentiated into stem and leaves, showing slight tissue differentiation, destitute of air-spaces. Rhizoids all with smooth walls. Antheridia in deep depressions or superficial and usually protected by scales or leaves, sometimes scattered, sometimes grouped together in more or less definite receptacles or androecia. Archegonia superficial but usually more or less protected by scales or leaves. Sporophyte differentiated into capsule, stalk, and foot, the capsule splitting irregularly at maturity or more commonly into four equal valves; elaters always present.

Gametophyte always a thallus (in Bermuda genera); archegonia not terminal and often not stopping the growth of the archegonial branch. Fam. 1. METZGERIACEAE.

Gametophyte differentiated into stem and leaves; archegonia terminal and stopping the growth of the archegonial branch Fam. 2. JUNGERMANNIACEAE.

Family 1. METZGERIÀCEAE.

METZGERIA FAMILY.

Thallus with lateral or ventral branches or apparently dichotomous, composed of similar cells throughout or with a distinct median strand of elongated cells. Antheridia borne on the upper surface of ordinary thallus-branches or of short, more or less specialized branches, situated in depressions or superficial, in the latter case often protected by scales

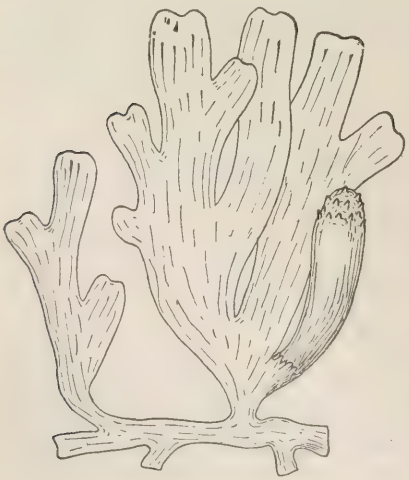
Archegonia superficial, borne on the upper surface of ordinary thallus-branches or of short, more or less specialized branches, often protected by scales and sometimes by tubular pseudoperianths. About 25 genera and 350 species, most abundant in tropical regions.

Thallus not developing a median strand of elongated cells. 1. *Riccardia.*
Thallus developing a distinct median strand of elongated cells.
  Thallus apparently dichotomous, antheridia and archegonia borne on short ventral branches. 2. *Metzgeria.*
  Thallus branching usually by adventive ventral branches, sometimes apparently dichotomous; antheridia and archegonia borne on ordinary thallus-branches. 3. *Pallavicinia.*

1. **RICCARDIA** S. F. Gray.

Thallus dark green, linear, with distinct lateral branches, the latter sometimes perpendicular to the substratum, composed of parenchyma with little differentiation. Antheridia borne in two rows on short branches with involute and often crenulate or dentate margins. Archegonia borne in irregular clusters on short branches, surrounded by irregular and minute, scale-like or filamentous structures. Calyptra fleshy, carrying up on its surface some of the protective structures, together with the unfertilized archegonia. Pseudoperianth none. Capsule oval, the wall splitting into four equal valves two cells thick, some or all of the cells with ring-like thickenings. Elaters usually with a single band of thickening, remaining attached to the free tips of the valves. Gemmae oval, mostly two-celled, formed directly from the protoplasmic contents of superficial thallus-cells. [Probably in honor of F. Riccardi, an Italian marquis.] About 150 species, mostly tropical. Type species: *R. multifida* (L.) S. F. Gray.

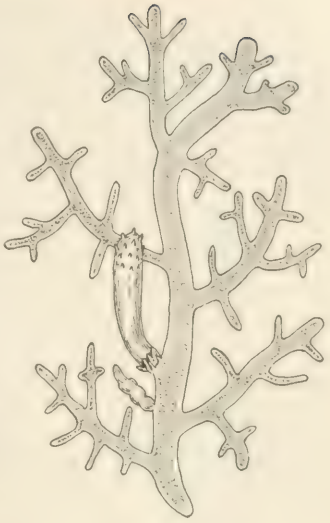
Thallus irregularly pinnate or palmate, the margins opaque and entire. 1. *R. latifrons.*
Thallus regularly bipinnate or tripinnate when well developed, the margins translucent and often crenulate. 2. *R. multifida.*



1. Riccardia lâtifrons Lindb. Broad Riccardia. (Fig. 499.) Thallus mostly 2″–5″ long, irregularly pinnate or palmate, the branches mostly ½″–1″ wide, often broadening out from a narrow base, opaque, thinning out to an entire margin one cell thick and one cell wide. Inflorescence autoecious; ring-like thickenings present in inner layer of capsule wall, absent (or nearly so) from outer layer.

On roots of plants and on the ground in swamps. Devonshire Marsh. Widely distributed in Europe, Asia, and North America.

2. Riccardia multífida (L.) S. F. Gray. CLEFT RICCARDIA. (Fig. 500.) Thallus mostly 5″–15″ long, regularly bipinnate or tripinnate, the branches about ¼″ wide, uniform in width or slightly tapering toward the apex, thinning out to a crenulate margin one cell thick and two or three cells wide. Inflorescence autoecious; ring-like thickenings present in outer layer of capsule wall, absent from inner layer. [*Jungermannia multifida* L.]



On moist soil in swamps. Devonshire and Paget marshes. Widely distributed in Europe, Asia, and North America.

2. **METZGERIA** Raddi.

Thallus pale green, linear, apparently regularly dichotomous, composed of a median strand of elongated cells surrounded by a single layer of enlarged cortical cells and bounded on each side by a broad wing one cell thick; unicellular hairs usually present. Antheridia borne on short ventral circinate branches with involute margins and distinct midribs. Archegonia borne on short ventral branches without a distinct midrib. Calyptra obovoid or clavate with numerous hairs. Pseudoperianth none. Capsule spherical, the wall splitting into four equal valves two cells thick, their walls without ring-like thickenings. Elaters usually with a single band of thickening, remaining attached to the free tips of the valves. Gemmae discoid, with or without midribs, borne on the margin or upper surface of the thallus. [Commemorates Johann Metzger, German horticulturist.] About 75 species, mostly tropical. Type species: *M. furcata* (L.) Dumort.

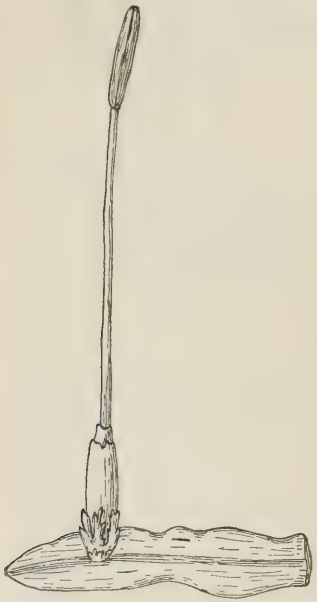


1. Metzgeria conjugàta Lindb. METZGERIA. (Fig. 501.) Growing in depressed mats, green, varying to yellowish green. Thallus about 1″ wide and 10″–15″ long, repeatedly forking, plane or somewhat convex, the midrib bounded above by two longitudinal rows of cortical cells, below by four; hairs borne on the margin, the lower surface of the midrib, and (occasionally) the lower surface of the wings, the marginal hairs usually in pairs; inflorescence autoecious; gemmae apparently none.

On rocks. Church Cave and Walsingham. Almost cosmopolitan. The Bermuda specimens are sterile and not quite characteristic, and their reference to the present species is therefore doubtful.

3. PALLAVICÍNIA S. F. Gray.

Thallus pale to dark green, forking or with ventral adventive branches, consisting of a thickened median portion, or midrib, with a central strand of elongated cells and two broad lateral wings one cell thick except toward the midrib; unicellular hairs lacking and margin entire. Antheridia in an elongated median group, protected by imbricated toothed scales. Archegonia in a circular median cluster, surrounded by variously toothed and more or less coalescent scales. Pseudoperianth tubular, ciliate or lacerate at the mouth. Capsule elongated, oval, the wall splitting into from two to four valves, two to six cells thick; ring-like thickenings none. Elaters with two or three bands of thickening, free from the valves. [Probably in honor of L. Pallavicini, Archbishop of Genoa.] About 25 species, mostly tropical and subtropical. The following typical.



1. Pallavicinia Lyéllii (Hook.) S. F. Gray. LYELL'S PALLAVICINIA. (Fig. 502.) Growing in irregular mats or scattered among other plants. Thallus almost always with ventral branches rapidly broadening out from a stalk-like base, mostly 2″–2½″ wide and 10″–20″ long, flat or slightly crispate along the margins; inflorescence dioecious; spores mostly 20–24 μ in diameter, the surface finely reticulated. [*Jungermannia Lyellii* Hook.]

On moist soil, sometimes submersed. Devonshire and Paget Marshes. Widely distributed, especially in tropical regions.

Family 2. JUNGERMANNIÀCEAE.

JUNGERMANNIA FAMILY.

Plant body usually prostrate or ascending, dorsiventral; branches lateral or ventral; leaves normally in three longitudinal ranks, two dorsal or lateral and one ventral, those of the ventral rank (the underleaves) smaller than the others and sometimes absent altogether. Antheridia borne singly or in small groups in the axils of more or less specialized leaves, the perigonial bracts. Archegonia borne singly or in groups at the tips of branches, surrounded by specialized leaves, the perichaetial bracts and bracteoles. Perianth present in many genera, consisting of a cylindrical or prismatic tube open at the apex. Capsule spherical to cylindrical. About 150 genera and some 4000 species, widely distributed, most abundant in tropical regions.

A. Leaves plane or nearly so, undivided or more or less deeply bifid with broad lobes.
1. Leaves succubous.
Leaves undivided.
Leaves ciliate. 1. *Plagiochila.*
Leaves entire. 4. *Odontoschisma.*

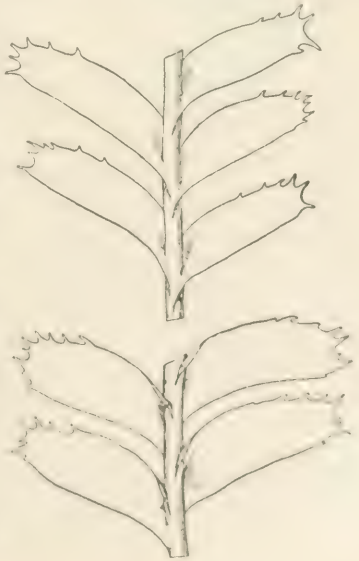
Leaves bifid.
Leaf-cells large, measuring 30–50 μ in diameter; plants pale green. 2. *Cephalozia.*
Leaf-cells minute, measuring 20 μ in diameter or less; plants dark green or reddish. 3. *Cephaloziella.*
2. Leaves incubous, undivided or slightly bifid. 5. *Calypogeia.*

B. Leaves deeply divided into hair-like lobes. 6. *Telaranea.*

C. Leaves deeply bilobed and complicate, the ventral lobe, or lobule, smaller than the dorsal and usually specialized as an inflated water-sac.
1. Underleaves none.
Plants large, perianth flattened and with a broad truncate mouth. 7. *Radula.*
Plants minute, perianth abruptly contracted to a small tubular mouth.
Perianth inflated, five-keeled. 8. *Cololejeunea.*
Perianth flattened, the two lateral keels sharp and distinct. 9. *Leptocolea.*
2. Underleaves present.
Lobule inflated but not helmet-shaped, attached to the dorsal lobe by a long keel.
Margin of dorsal lobe entire or nearly so.
Perianth inflated, sharply five-keeled.
Plants pale green and delicate. 10. *Lejeunea.*
Plants yellowish green and firm. 12. *Euosmolejeunea.*
Perianth flattened, the two lateral keels sharp. 11. *Rectolejeunea.*
Margin of dorsal lobe crenulate from projecting cells. 13. *Crossotolejeunea.*
Lobule normally inflated, helmet-shaped, with a stalk-like base, keel usually very short.
Subfloral innovations (borne just behind the innermost perichaetial bracts) present. 14. *Jubula.*
Subfloral innovations absent. 15. *Frullania.*

1. **PLAGIOCHÌLA** Dumort.

Stems ascending from a prostrate rhizome, simple or with lateral branches. Leaves succubous, undivided, decurrent dorsally and ventrally, the margin varying from entire to ciliate or spinose. Underleaves usually minute and short-lived. Inflorescence dioecious. Antheridia from one to ten in the axils of bracts saccate at the base, the bracts imbricated and usually arranged in elongated androecia often proliferating at the apex. Perichaetial bracts similar to the leaves but often broader and more toothed. Perianth laterally compressed, the mouth broad, truncate, and variously dentate to ciliate. [Greek, oblique lip.] Some 800 species or more, mostly tropical. Type species: *P. asplenioides* (L.) Dumort.

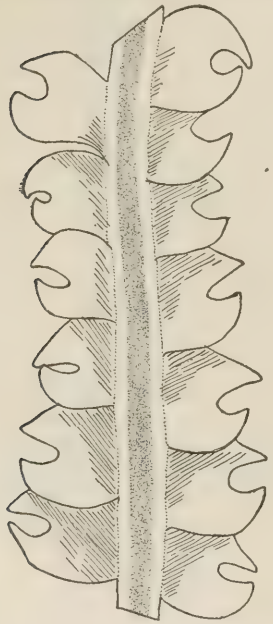


1. Plagiochila Smállii Evans. SMALL'S PLAGIOCHILA. (Fig. 503.) Loosely tufted, usually dark green. Stems sparingly and irregularly branched. Leaves obliquely spreading, distant, the largest about 1½″ long and ½″ wide, narrowly ovate to ligulate, truncate at the apex, sharply 6–12-toothed; perianth campanulate, sharply spinose-ciliate at the mouth.

On moist rocks. Paynter's Hill and Paynter's Vale. Known also from tropical Florida.

2. **CEPHALÒZIA** Dumort.

Stems sparingly and irregularly branched, the branches almost always ventral, sometimes flagelliform. Leaves succubous, obliquely attached and often decurrent, two-lobed. Leaf-cells large (mostly 30–50 μ in diameter) and transparent, mostly with thin walls. Underleaves minute or none. Antheridia borne singly in the axils of more or less saccate bracts, the latter imbricated, forming androecia variable in length and rarely proliferating. Archegonia usually borne on short ventral branches. Bracts and bracteoles similar, larger than the leaves, variously cleft or lobed. Perianth triangular-prismatic with one keel ventral, the mouth constricted, crenulate to ciliate. Gemmae unicellular or bicellular. [Greek, twig-headed.] Species about 60, mostly of temperate regions. Type species: *C. bicuspidata* (L.) Dumort.



1. Cephalozia connívens (Dicks.) Lindb. CEPHALOZIA. (Fig. 504.) Plants pale green, growing in depressed mats. Stems bounded by a layer of large cells; leaves loosely arranged on the stem, almost longitudinally attached, orbicular, bifid one half or less with acute connivent lobes and a rounded sinus, leaf-cells large, about 50 μ in diameter; underleaves none; inflorescence autoecious; androecium occupying a small ventral branch, not proliferating; archegonia borne on a small ventral branch; bracts deeply and irregularly 3–5-cleft with narrow entire acuminate lobes; bracteole bifid with similar lobes, more or less coalescent with the bracts; mouth of perianth long-ciliate. [*Jungermannia connivens* Dicks.]

On moist soil. First collected by Moseley. Devonshire Marsh. Widely distributed in Europe, Asia, and North America.

3. **CEPHALOZIÉLLA** [Spruce] Schiffn.

Plants very small. Stems sparingly and irregularly branched, the branches ventral or lateral, never flagelliform. Leaves almost transversely inserted and often somewhat channeled, two-lobed. Leaf-cells small (mostly 12–20 μ in diameter), often with thickened and pigmented walls. Underleaves sometimes present. Antheridia borne singly in the axils of the bracts, the latter similar to the leaves or somewhat specialized, imbricated, forming more or less distinct androecia of varying length, sometimes proliferating. Archegonia usually borne on elongated branches, rarely on short ventral branches. Bracts and bracteoles similar, larger than the leaves, more or less connate, variously lobed or cleft, the divisions often dentate. Perianth prismatic with from three to six angles, elongated, the mouth contracted, crenulate or dentate. Gemmae unicellular or bicellular. [Diminutive of *Cephalozia*.] About 50 species, mostly of temperate regions, the following typical.

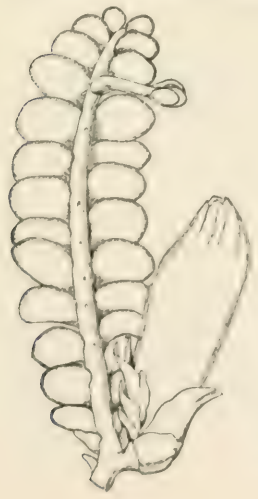


1. Cephaloziella byssàcea (Roth) Warnst. CEPHALOZIELLA. (Fig. 505.) Plants green, often more or less pigmented with reddish or purplish, growing in more or less compact mats or mixed with other plants. Leaves distant to subimbricated, quadrate, divided to the middle or beyond into two ovate-lanceolate, mostly acute divisions, entire; leaf-cells 10–15 μ in diameter, slightly or not at all thickened; underleaves usually distinct, lanceolate to ovate, sometimes shortly bifid; inflorescence dioecious; androecia composed of from six to twelve pairs of imbricated bracts, often proliferating; archegonia borne on an elongated branch; bracts and bracteole bifid with sharply dentate lobes, more or less coalescent; mouth of perianth crenulate. [*Jungermannia byssacea* Roth.]

On moist soil, Devonshire Marsh. Widely distributed in Europe, Asia, and North America. The Bermuda specimens are in poor condition and are doubtfully referred to the present species. They have already been listed from Bermuda as *Cephalozia divaricata* (Sm.) Dumort., a synonym of *Cephaloziella byssacea*.

4. ODONTOSCHÌSMA Dumort.

Stems prostrate, sparingly and irregularly branched, the branches lateral or ventral, often flagelliform. Leaves succubous, obliquely attached, undivided, entire, and usually rounded or truncate at the apex. Leaf-cells usually with more or less thickened walls. Underleaves present but often minute and short-lived. Antheridia borne in the axils of imbricated and bifid bracts, the latter forming androecia of variable length, not proliferating. Archegonia borne on short ventral branches, the terminal portion swelling after fertilization. Bracts and bracteoles similar, usually bifid, not coalescent. Perianth triangular-prismatic with one keel ventral, the mouth suberenulate to ciliate, constricted, irregularly sinuate or lobed. Gemmae unicellular or bicellular. [Greek, split tooth.] Species about 25, largely tropical. Type species: *O. Sphagni* (Dicks.) Dumort.

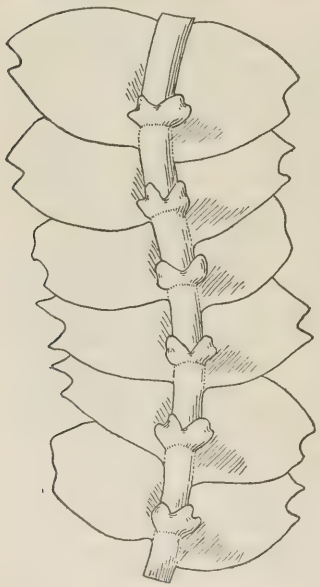


1. Odontoschisma prostràtum (Sw.) Trevis. PROSTRATE ODONTOSCHISMA. (Fig. 506.) Plants pale green, often more or less pigmented with brownish, growing in depressed mats or creeping among other plants; branches all ventral, some of them flagelliform. Leaves distant to loosely imbricated, orbicular to oblong, about $\frac{1}{2}$″ long, median leaf-cells about 20 μ in diameter, thin-walled but with distinct trigones; marginal cells (in from one to four rows) forming a distinct border with walls uniformly thickened; underleaves minute; perichaetial bracts and bracteoles bifid about one half with slender acuminate and subentire lobes; mouth of perianth entire to short-setulose. [*Jungermannia prostrata* Sw.]

On moist soil, Devonshire and Paget Marshes. Widely distributed from Massachusetts to Florida, also in tropical America. Easily distinguished by its succubous, undivided leaves.

5. **CALYPOGÈIA** Raddi.

Stems prostrate, sparingly and irregularly branched, the branches almost always ventral and arising in the axils of the underleaves. Leaves incubous, obliquely attached, oblong or ovate, undivided or bidentate at the apex, entire or nearly so. Leaf-cells mostly delicate and thin-walled. Underleaves large, distant to imbricated, orbicular to reniform, rounded at the apex or more or less bifid. Antheridia borne singly or in pairs in the axils of small and delicate saccate bracts, variously toothed at the apex, the bracts forming short ventral androecia, not proliferating. Archegonia borne on short ventral branches; bracts minute and irregularly toothed at the apex; perianth none; sporophyte developed within a fleshy pendent perigynium. Capsule cylindric, with spirally twisted valves. Gemmae unicellular or bicellular. [Greek, earth-calyx.] Species about 50, largely tropical. Type species: *C. fissa* (L.) Raddi.



1. Calypogeia fissa (L.) Raddi. CLEFT CALYPOGEIA. (Fig. 507.) Plants glaucous green, translucent, growing in depressed mats or creeping among other plants. Leaves loosely imbricated, broadly ovate, mostly about 1″ long, the apex variable but usually shortly bilobed or bidentate with rounded to subacute lobes or teeth and a shallow rounded sinus; leaf-cells about 45 μ in diameter, thin-walled and usually without trigones; underleaves distant, broader than long, deeply bifid with blunt lobes, each often bearing a lobe-like tooth on the outer side. [*Mnium fissum* L.]

On moist soil, Devonshire Marsh, *E. G. Britton.* Europe; eastern North America; perhaps Japan. Distribution incompletely known. Previously listed from Bermuda as *Kantia Trichomanis* (L.) S. F. Gray.

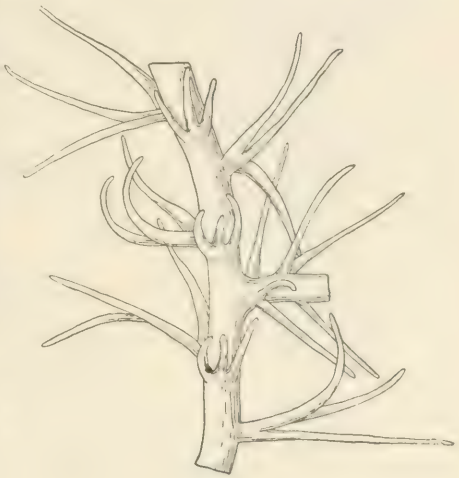
6. **TELARANÈA** Spruce.

Plants delicate and filmy. Stems prostrate, sparingly and more or less pinnately branching, the branches mostly lateral, rarely ventral, never flagelliform. Leaves almost transversely attached, divided practically to the base into two or three filiform divisions, each composed of a single row of elongated and thin-walled cells. Underleaves much smaller, bifid (or trifid) with short incurved, filiform divisions. Antheridia borne singly in the axils of scarcely

modified bracts, the latter in about five pairs, occupying the whole or the apex of a lateral branch. Archegonia usually borne on a short ventral branch, more rarely at the apex of the stem or an elongated lateral or ventral branch. Bracts and bracteoles similar, deeply 3–5-parted, with a low basal membrane and narrow subulate divisions. Perianth terete below, obtusely triangular toward the constricted and ciliate mouth. [Greek, cobweb.] Two species, the following and the typical *T. chaetophylla* Spruce.

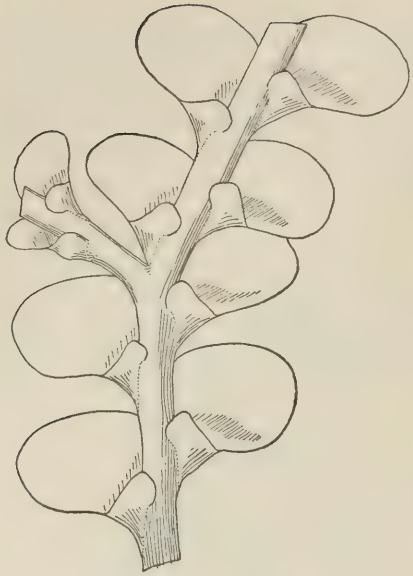
1. Telaranea nematòdes (Gottsche) M. A. Howe. TELARANEA. (Fig. 508.) Plants pale green, forming loose tufts or creeping among other plants. Leaves distant to imbricated, the divisions four to eight cells long, and the cells mostly twice to four times as long as broad; underleaves bifid or trifid with the divisions two or three cells long; inflorescence autoecious. [*Jungermannia nematodes* Gottsche.]

On moist soil, Devonshire Marsh, *M. A. Howe*. Long Island to Florida and Louisiana; tropical America and Africa.



7. RÀDULA Dumort.

Stems prostrate or growing from a prostrate rhizome, with numerous lateral branches arising just behind normal leaves; rhizoids always borne on the ventral lobes of the leaves. Leaves complicate-bilobed, the dorsal lobes larger than the ventral, incubous, usually entire and often rounded at the apex; ventral lobes attached to the dorsal by a more or less elongated keel, the free margin usually appressed to the dorsal lobe. Underleaves none. Antheridia borne singly or in groups of two or three in the axils of saccate bracts, the latter forming more or less elongated androecia. Archegonia borne on more or less elongated branches, sometimes with subfloral innovations; bracts similar to the leaves. Perianth usually dorsiventrally compressed, rarely subterete or plicate, truncate and bilabiate but otherwise entire at the broad mouth. Gemmae, when present, discoid, multicellular. [Latin, a scraper or spatula.] About 400 species, largely tropical. Type species: *R. complanata* (L.) Dumort.

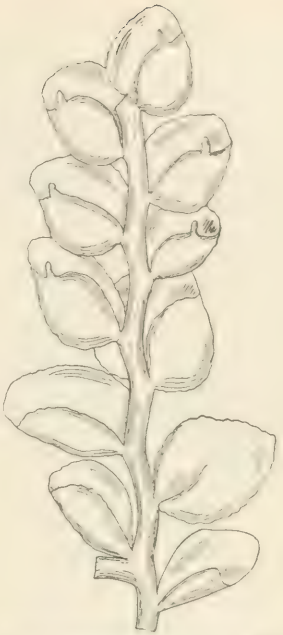


1. Radula pállens (Sw.) Dumort. PALE RADULA. (Fig. 509.) Plants dark green, often brownish, growing in loose tufts. Stems loosely and irregularly pinnate, the female plants often apparently dichotomous on account of subfloral innovations; leaves imbricated, the dorsal lobe ovate-orbicular and rounded at the apex, the ventral lobe trapezoidal, attached to the stem throughout the greater part of its length, the apex inflexed, blunt; inflorescence dioecious; perianth elongated, clavate, compressed.

On rocks, Church Cave, Harrington House, Paynter's Hill, Paynter's Vale and Walsingham. Widely distributed in tropical America, especially in the West Indies.

8. **COLOLEJEÙNEA** [Spruce] Schiffn.

Stems prostrate, minute and delicate, irregularly branched, the branches as in *Radula;* rhizoids arising from the ventral surface of the stem. Leaves complicate-bilobed, the dorsal lobes larger than the ventral, incubous, attached by a very narrow base, convex, widely spreading, broadly ovate to lanceolate, entire to crenulate or denticulate from projecting cells; lobule inflated, attached to the lobe by a long arched keel, usually with two teeth in the apical region; leaf cells uniform, often highly convex or tuberculate, usually thin-walled and without trigones. Underleaves none. Antheridia borne singly or in pairs in the axils of saccate bracts, the latter in more or less elongated androecia. Archegonia borne singly on more or less elongated branches, with one or two subfloral innovations, the bracts with plane lobules. Perianth inflated, 5-keeled, abruptly narrowed to a more or less distinct tubular beak. Gemmae discoid, borne on the surface of the leaves. [Greek, clipped *Lejeunea.*] About 100 species, mostly tropical. Type species: *C. calcarea* (Lib.) Schiffn.



1. Cololejeunea minutíssima (Sm.) Schiffn. MINUTE COLOLEJEUNEA. (Fig. 510.) Plants yellowish green, varying to dark green, loosely tufted or scattered. Leaves distant to subimbricated, the dorsal lobe spreading, convex, ovate to subrotund, about $\frac{1}{10}''$ long, crenulate, rounded to very obtuse at the apex; lobule almost as long as the lobe, inflated, with two teeth in the apical region when well developed but often rudimentary; leaf-cells thin-walled throughout; inflorescence autoecious; perianth obovoid, sharply 5-keeled in upper part, truncate or rounded at the apex with a short beak. [*Jungermannia minutissima* Sm.]

On trees, Devonshire Marsh, Walsingham Caves, and Abbot's Cliffs. Western and southern Europe; South Carolina to Florida and Texas.

9. **LEPTOCÒLEA** [Spruce] Evans.

Distinguished primarily from *Cololejeunea* by its strongly flattened perianth with sharp lateral keels. Dorsal lobe of the leaves usually rounded at apex; leaf-cells more variable than in *Cololejeunea*, sometimes with thickened walls and distinct trigones, sometimes differentiated as ocelli or as empty and hyaline cells. In other respects agreeing with *Cololejeunea*. [Greek, slender sheath.] About 30 species, mostly tropical. Type species: *L. micrandroecia* (Spruce) Evans.



1. Leptocolea Jooriàna (Aust.) Evans. JOOR'S LEPTOCOLEA. (Fig. 511.) Yellowish green or whitish, loosely tufted or scattered. Leaves imbricated, the dorsal lobe widely spreading, plane, ovate, about $\frac{1}{4}''$ long, gradually narrowed to the apex, usually bearing from one to ten hyaline cells with free extremities; lobule about half as long as the lobe, with two teeth in the apical region; leaf-cells with slightly thickened walls and indistinct trigones; inflorescence paroecious or synoecious; perianth ovate to obovate in outline, truncate to very slightly retuse at the apex with a very short beak. [*Lejeunea Jooriana* Aust.]

On trees, Paynter's Hill and Devonshire Marsh, *W. A. Howe*. North Carolina to Florida and Louisiana; Bahamas; Porto Rico.

10. **LEJEÙNEA** Libert.

Stems prostrate, small, irregularly branched, the branches as in *Radula;* rhizoids springing from the bases of the underleaves. Leaves complicate-bilobed, the dorsal lobes larger than the ventral, incubous, attached by a long, almost longitudinal line, plane or convex, widely spreading, ovate to obovate, rounded to obtuse at the apex, entire or slightly crenulate; lobule when well developed inflated, acute, bearing a hyaline papilla at the base of the apical tooth on the side next to the stem; leaf-cells thin-walled but sometimes with small trigones. Underleaves ovate to orbicular, bifid, the division mostly entire or crenulate. Antheridia borne singly or in pairs in the axils of saccate bracts, the latter in more or less elongated androecia. Archegonia borne singly on branches variable in length with one or two subfloral innovations, the bracts with plane lobules, bracteole bifid. Perianth inflated, 5-keeled, abruptly narrowed to a distinct tubular beak. [Commemorates A. L. S. Lejeune, Belgian botanist.] Nearly 200 species, mostly tropical. Type species: *L. cavifolia* (Ehrh.) Lindb.



1. Lejeunea minutíloba Evans. SMALL-LOBED LEJEUNEA. (Fig. 512.) Bright or pale green, loosely tufted or mixed with other plants. Leaves contiguous or slightly imbricated, the lobe ovate, about $\frac{1}{3}$″ long, rounded at the apex, entire or nearly so; lobule represented by a minute, basal fold; leaf-cells thin-walled, with scarcely evident trigones; underleaves distant, orbicular, bifid about one third with broad, rounded or bluntly pointed lobes and a narrow sinus, slightly crenulate on the margins; inflorescence autoecious; female inflorescence borne on a long or short branch with a single innovation; bracts shorter than the leaves; bracteole sharply bifid with obtuse to rounded divisions; perianth obovate in outline, 5-keeled in the upper part.

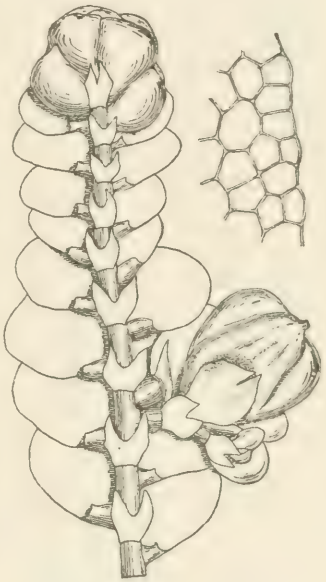
On stones, rocks, and trees, Church Cave and vicinity, 1900, *M. A. Howe* 7; 1908, *S. Brown, 504, 505*; 1912, *E. G. Britton 1088*; Walsingham, 1900, *M. A. Howe 3*; 1905, *E. G. Britton 286*; Tuckerstown, 1905, *E. G. Britton 323*; 1908, *S. Brown 516*; Abbot's Cliff, 1912, 1913, *E. G. Britton 888, 931, 932* (in part), *933, 1867*; without definite locality, 1908, *S. Brown 559a*. West Indies. Previously listed from Bermuda as *L. glaucescens* Gottsche.

11. **RECTOLEJEÙNEA** Evans.

Differs primarily from *Lejeunea* in its flattened perianth with sharp lateral keels. Dorsal lobes, lobules and underleaves similar, but the lobes commonly broader; ocelli sometimes present among the leaf-cells. [Greek,

fragile *Lejeunea*.] About 40 species, largely of tropical America. Type species: *R. flagelliformis* Evans.

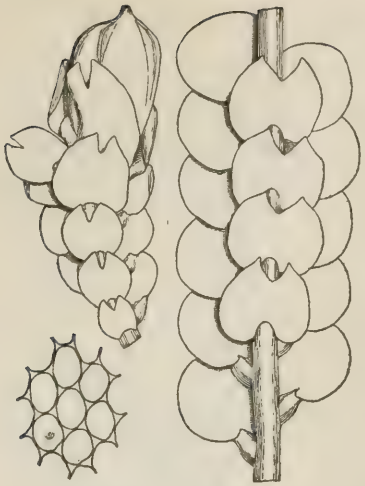
1. Rectolejeunea phyllóbola (Nees & Mont.) Evans. RECTOLEJEUNEA. (Fig. 513.) Pale green, growing in depressed mats. Leaves loosely imbricated, the lobe orbicular ovate, about ¼″ long, rounded at the apex, entire or nearly so; lobule inflated, ovate, apex usually tipped with a single blunt cell; leaf-cells thin-walled with small trigones; ocelli none; underleaves distant, bifid to beyond the middle with narrow divisions and an acute to lunulate sinus; inflorescence autoecious; female inflorescence usually borne on a short branch with a single subfloral innovation; bracts similar to the leaves but with plane narrow lobules; bracteole bifid about one third with acute divisions and a narrow sinus; perianth obovate in outline, truncate or slightly retuse at the apex, beak short, ventral surface with a broad bluntly 2-angled keel. [*Lejeunea phyllobola* Nees & Mont.]



On trees, Church Cave, Walsingham Caves, Paynter's Hill, Castle Harbor; Florida; tropical North America.

12. **EUOSMOLEJEÙNEA** [Spruce] Schiffn.

Yellowish green and firm. Stems prostrate, often elongated, irregularly branched, the branches as in *Radula;* rhizoids springing from the bases of the underleaves. Leaves complicate-bilobed, the dorsal lobes much larger than the ventral, incubous, attached by a long line, broadly ovate, convex, rounded at the apex, entire or nearly so; lobule strongly inflated, acute, bearing a hyaline papilla in the sinus, at the base of the apical tooth; leaf-cells with conspicuous trigones; ocelli none. Underleaves varying from medium-sized to large, sometimes imbricated, orbicular and often cordate at the base, usually bifid with an acute to lunulate sinus, rarely undivided. Antheridia usually in pairs in the axils of saccate bracts, the latter in more or less elongated androecia, often proliferating. Female inflorescence borne on a more or less elongated branch, with one or two subfloral innovations; bracts similar to the leaves but with plane lobules and sometimes with pointed lobes; bracteole bifid, free. Perianth often roughened by projecting cells, sharply 5-keeled, the keels rounded above, beak distinct. Gemmae none. [Greek, fragrant *Lejeunea*.] About 35 species, largely tropical. Type species: *E. trifaria* (Reinw. Bl. & Nees) Schiffn.



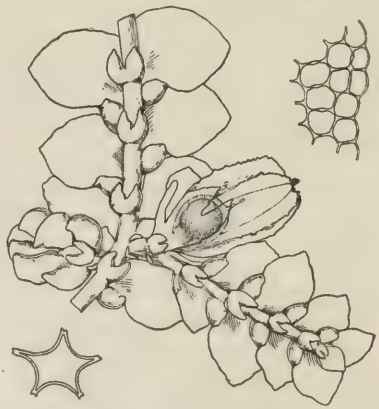
1. Euosmolejeunea clausa (Nees & Mont.) Evans. EUOSMOLEJEUNEA. (Fig. 514.) In loose depressed mats. Leaves loosely imbricated, the lobe broadly ovate, about ¼″ long; leaf-cells with large trigones; underleaves contiguous or imbricated, bifid about one third with obtuse or acute divisions and an obtuse or acute sinus; inflorescence dioecious; androecium borne on a short branch, sometimes proliferating; female inflorescence borne on a short branch, with one subfloral innovation. [*Lejeunea clausa* Nees & Mont.]

On trees and rocks, Paynter's Hill, *M. A. Howe.* South Carolina to Florida and Alabama; tropical America.

13. **CROSSOTOLEJEÙNEA** [Spruce] Schiffn.

Yellowish or pale green, delicate. Stems prostrate, irregularly branched, the branches as in *Radula;* rhizoids springing from the bases of the underleaves. Leaves complicate-bilobed, the dorsal lobes much larger than the ventral, incubous, widely spreading, abruptly expanded from a narrow base, ovate to orbicular, mostly acute or obtuse, crenulate; lobule much as in *Lejeunea;* leaf-cells thin-walled but with distinct trigones and intermediate thickenings. Underleaves small, ovate to orbicular, deeply bifid with acute lobes, crenulate or dentate. Female inflorescence borne on a short branch or on an elongated branch, with one or two subfloral innovations; bracts and bracteole similar to the leaves and underleaves. Perianth sharply 5-keeled with the keels more or less crenulate or dentate. [Greek, fringed *Lejeunea.*] An American genus of about 25 species, mostly tropical. Type species: *C. Boryana* (Mont.) Schiffn.

1. Crossotolejeunea bermudiàna Evans. BERMUDA CROSSOTOLEJEUNEA. (Fig. 515.) In loose depressed mats. Leaves distant to loosely imbricated, the lobe widely spreading, more or less convex, orbicular, ovate, about ¼″ long, crenulate; leaf-cells with small but distinct trigones and intermediate thickenings; ocelli none; underleaves distant, orbicular, bifid about one half with erect, obtuse, acute or apiculate divisions, and a narrow sinus, crenulate, sometimes unidentate on each side; inflorescence autoecious; androecium occupying a short branch; bracts in two or three pairs, with two antheridia; keels of perianth crenulate or denticulate.



On the ground and on rocks, Flatts and Paynter's Vale. Recently discovered in Florida, but known from no other localities.

14. **JÙBULA** Dumort.

Dark green, never pigmented with red or brown. Stems prostrate, sparingly branched, most of the branches arising at the bases of leaves without lobules, rhizoids springing from the base of the underleaves. Leaves deeply complicate-bilobed, the dorsal lobes much larger than the ventral, incubous, widely spreading, ovate to orbicular, rounded to cuspidate, margin entire or more or less spinose-dentate, lobules normally inflated, helmet-shaped, rarely explanate and pointed; leaf-cells with distinct trigones; ocelli none. Underleaves smaller than the leaves, bifid with a narrow sinus and obtuse or acuminate divisions, entire or sparingly spinose on the margins. Antheridia mostly in pairs in the axils of saccate bracts with explanate lobules, the latter forming more or less elongated androecia, rarely proliferating at the apex. Female inflorescence borne on an elongated branch or on a subfloral innovation, with one or two subfloral innovations arising in the same way as the branches of *Radula;* bracts larger than the leaves and with explanate lobules; bracteole bifid, free. Perianth sharply 3-keeled, with one keel ventral, abruptly constricted into a short tubular beak. [Latin, a little mane.] About 10 species, chiefly tropical. Type species: *J. Hutchinsiae* (Hook.) Dumort.

1. Jubula pennsylvànica (Steph.) Evans. PENNSYLVANIA JUBULA. (Fig. 516.) In loose depressed mats or creeping among other plants. Leaves loosely imbricated, the lobe rounded to apiculate, entire; lobule destitute of an apical spur; underleaves with blunt to acuminate divisions and entire margins; inflorescence autoecious; perichaetial bracts with abruptly apiculate or acuminate lobes, entire or unidentate. [*Frullania pennsylvanica* Steph.]

On wet rocks, Paynter's Vale, *M. A. Howe.* Nova Scotia to Georgia, west to Arkansas.



15. **FRULLÀNIA** Raddi.

Dark green or more or less pigmented with yellow, brown or red. Stems prostrate, ascending or pendent, more or less copiously branched, the branches all arising at the bases of leaves without lobules, rhizoids springing from the bases of the underleaves. Leaves deeply complicate-bilobed, the dorsal lobes much larger than the ventral, incubous, widely spreading, ovate to orbicular, usually entire; lobule normally inflated, helmet-shaped; leaf-cells with distinct trigones; ocelli present in certain species. Underleaves smaller than the leaves,

usually bifid. Antheridia mostly in pairs, in the axils of inflated bracts with explanate lobules, the bracts imbricated and forming short or more or less elongated androecia. Female inflorescence borne on a more or less elongated branch, without innovations; bracts larger than the leaves, with explanate lobules and often more or less connate with the bifid bracteole. Perianth normally 3-keeled, with one keel ventral, but often with supplementary folds, abruptly contracted into a short tubular beak. [Commemorates L. Frullani, a Florentine minister of state.] A very large genus, 800 or more described species, mostly tropical. Type species: *F. dilatata* (L.) Dumort.



1. Frullania squarròsa (Reinw. Bl. & Nees) Dumort. SPREADING FRULLANIA. (Fig. 517.) Dark green or pigmented with brown, scattered or growing in depressed mats. Leaves imbricated, the lobe rolled around the stem when dry, strongly squarrose when moist, ovate, rounded at the apex, and entire; lobule about as broad as long; under leaves bifid, usually with entire margins; inflorescence dioecious; female inflorescence borne on a short and simple branch, bracts in about three pairs; perianth oblong, without supplementary keels, surface more or less roughened by scattered tubercles or scales, especially along the kels. [*Jungermannia squarrosa* Reinw. Bl. & Nees.]

On rocks and trees, Paynter's Vale and Walsingham. Widely distributed in tropical and subtropical regions, extending as far north, in the United States, as Connecticut.

Order 3. ANTHOCEROTÀLES.

Gametophyte a prostrate dorsiventral thallus, varying from strap-shaped to circular, with very little cell-differentiation, usually quite destitute of air-spaces but sometimes developing intercellular spaces with mucilage; green cells with one or a few large flat chloroplasts, often with a single pyrenoid. Antheridia borne singly or in groups just below the upper surface of the thallus. Archegonia in irregular dorsal groups, imbedded, the tip of the neck alone projecting. Sporophyte differentiated into a broad foot and an elongated cylindrical capsule, the latter growing indefinitely by means of a basal embryonic region, splitting at maturity into two valves. Spores surrounding a central sterile structure, the columella, and interspersed with irregular, often multicellular elaters, with or without bands of thickening. Four or five genera and about 150 species, widely distributed.

Family 1. **ANTHOCEROTÀCEAE.**

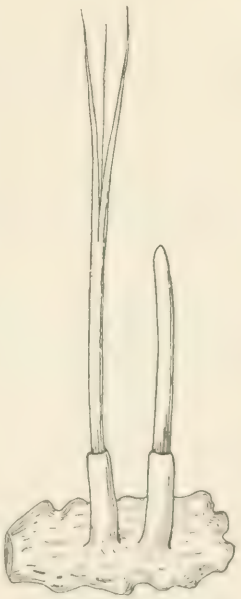
ANTHOCEROS FAMILY.

Characters of the order.

1. **ANTHÓCEROS** L.

Thallus suborbicular, variously lobed and often with plate-like outgrowths, sometimes irregularly dissected, several cells thick and destitute of a distinct midrib; green cells with a single chloroplast. Inflorescence usually (if not always) monoecious. Capsule erect, much longer than the basal sheath, with green cells in the wall and stomata in the epidermis. Spores variously roughened; elaters without spiral bands of thickening, composed of one to several cells and sometimes branched. [Greek, flowering horn.] About 50 species, largely tropical. Type species: *A. punctatus* L.

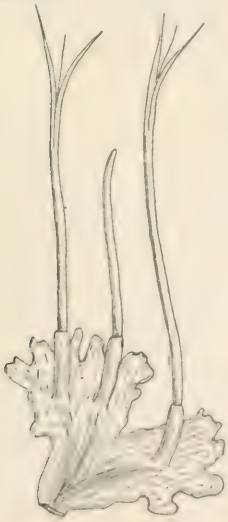
Spores yellow. 1. *A. laevis.*
Spores black or nearly so. 2. *A. punctatus.*



1. Anthoceros laèvis L. YELLOW-SPORED ANTHOCEROS. (Fig. 518.) Thallus nearly plane on the upper surface, dark green and somewhat lustrous, destitute of intercellular spaces. Capsule mostly ½′–1½′ long, the base surrounded by a cylindrical sheath often flaring at the mouth; spores yellow, the surface granular-papillose; elaters yellowish, very variable in size and form, often branched.

On moist soil, Walsingham, *S. Brown.* The most widely distributed species in Europe, Asia, and North America, extending into higher latitudes.

The slender green capsules of *Anthoceros*, when abundantly produced, resemble tufts of grass. Mature spores are necessary for the determination of the species.



2. Anthoceros punctàtus L. BLACK-SPORED ANTHOCEROS. (Fig. 519.) Thallus smaller than in *A. laevis*, and more or less roughened on the upper surface, paler green and more delicate, with distinct intercellular spaces in the interior. Capsule mostly ½′–1½′ long, the base surrounded by a cylindrical sheath; spores black or nearly so, the outer surface covered with short spines or papillae; elaters brownish, very variable in size and shape, rarely (if ever) more than three cells long.

On moist soil, Basset Cave Road and Walsingham Caves, *H. Kennedy.* Widely distributed in Europe and North America.

Phylum 4. THALLÓPHYTA.

This phylum includes many thousand species of simple organization, grouped in many genera and families. The plants composing it have scarcely any woody tissue, and are propagated either by spores or by vegetative division. Most of them are small, but there are some large and conspicuous types in all the classes.

Terrestrial, saxicolous, or corticicolous plants, composed of filaments without chlorophyll and of cells containing chlorophyll. Class 1. LICHENES.
Terrestrial or corticicolous plants, or microscopic aquatics, wholly without chlorophyll. Class 2. FUNGI.
Aquatic plants, or microscopic terrestrial or corticicolous organisms with chlorophyll. Class 3. ALGAE.

Class 1. LICHÈNES.

LICHENS.

CONTRIBUTED BY LINCOLN W. RIDDLE.

INTRODUCTION.

Lichens vary so much in appearance and in structure that it is difficult to formulate in non-technical terms any precise statement of their characters. In general, they have a plant-body, known as a thallus, which may appear merely as a discoloration on the bark or rock, or as an irregular, and variously divided membrane, separable from the substratum, or as a tufted growth with erect or pendent branches. The color of this thallus varies as much as the structure: gray, gray-green, whitish or brownish, being the commonest, but orange, red, and black, also occurring. But with all their variety, lichens never have an axis and leaves, and are never grass-green.

Investigations have shown that this lichen-thallus is actually formed by a fungus growing in association with an alga, the association usually being so intimate and the resulting structure so definite that it appears to be an independent type of plant. On this thallus are borne fruiting-bodies, in the form either of minute closed flasks (perithecia), or, more commonly, as open disk-like or cup-shaped apothecia.

Lichens may grow on rocks, on the ground, or on the branches or trunks of trees. Oftentimes they grow on bare surfaces that will not support any other form of plant-life.

Our knowledge of the lichens of Bermuda is based upon three sets of collections. The first was made by H. N. Moseley in connection with the Challenger Expedition in 1872. A list of these lichens, 25 in number, was published by Crombie in the Journal of the Linnaean Society of London for 1877. In 1880 and again in 1881, Professor W. G. Farlow, of Harvard

University, visited Bermuda and collected about 20 species of lichens, some of which were studied by Tuckerman. Between 1905 and 1914, collections were made by Dr. and Mrs. N. L. Britton, Dr. F. J. Seaver, and Messrs. Stewardson Brown and Paul Bisset, resulting in the finding of 65 species and varieties, of which 50 had not been previously reported. As a result of these several collections, we now have a total of 85 species and varieties of lichens known to occur in Bermuda. Ten of these species are endemic. An enumeration of these lichens with descriptions of new species and varieties was published in the Bulletin of the Torrey Botanical Club for April, 1916.

It is probable that continued search in the islands would reveal a few additional species. But it does not seem likely that there are over 100 lichens in the flora. The small area of the islands, the so-called coral formation, and the large proportion of cultivated land, all combine to make the conditions unfavorable for any considerable development of lichens. As a general rule, the higher foliose and fruticose lichens, being more exposed on account of their looser connection with the substratum, demand for their development more favorable conditions than do the less exposed crustose forms. The proportion of 23 species of the former types to 62 of the latter is interesting testimony as to the character of the environment. Further evidence of this is afforded by the considerable number of sterile or depauperate specimens.

Given these conditions it will be of interest to see what lichens there are occurring in Bermuda, and then to indicate briefly the geographical affinities of the lichen-flora. The lichens will be taken up in systematic order with brief notes as to the more easily recognizable characters.

GENERAL SYSTEMATIC ACCOUNT.

Order 1. PYRENOCARPÀLES.

Family 1. VERRUCARIÀCEAE.

The three species of this family grow on calcareous rocks, especially along the shore.* The black perithecia are at first more or less immersed in the rock, but when mature fall out leaving shallow pits. They play an important part in the weathering of the rocks. *Verrucaria rupestris* Schrad. is a cosmopolitan lichen, represented in Bermuda by two forms; the typical form with very thin continuous thallus, of a grayish color; and the var. *ruderum* DC. with a thicker thallus which is more or less cracked and areolate; the spores are one-celled. The other two species are endemic, and belong to the genus *Thelidium*, which is distinguished by having two-celled spores. Both species were discovered by Professor W. G. Farlow, and the first has been named in his honor. *Thelidium Farlowi* Riddle

* It is to be understood that all general and comparative statements in this account of the lichens are intended to apply to the Bermuda species only.

appears as a dark bluish-gray stain on the rocks, with the perithecia tending to be confluent in groups of two or more, and has spores measuring 18–20 × 7–9 micromillimeters; *T. bermudanum* (Nyl.) Riddle has scarcely any visible thallus, and the perithecia are smaller and scattered, and the spores only 11–12 × 3.5–4.5 micromillimeters.

Family 2. PYRENULÀCEAE.

These lichens all grow on bark or dead wood. *Porina nucula* Ach., growing on orange trees at Paynter's Vale, has a pale brown thallus and rather prominent, globose perithecia of the same color, except for the ostioles which are reddish. *Porina tetracerae* (Ach.) Muell. Arg., on coffee trees at Walsingham, has a shining, olive-green thallus which makes it conspicuous, and in this the perithecia are buried, with only the black ostioles showing. *Porina phaea* (Ach.) Muell. Arg. is quite different and looks more like a fungus; its thin gray thallus is scarcely noticeable and the innate perithecia are entirely black; it has been found only at Harrington House, where it grows on *Juniperus.*

Pyrenula aurantiaca Fée is one of the most striking of tropical lichens, its very smooth thallus forming orange patches of considerable size on the bark of *Rhizophora,* and entirely covering the perithecia. *Pyrenula brachysperma* Muell. Arg. is a rare species collected at one locality on Hall's Island, where it was growing on the bark of *Eugenia axillaris;* it was previously known only from northern Brazil. In appearance this species is very distinct; the whitish thallus is very thin; and the perithecia, often confluent in twos, form conspicuous black spots on the bark. The species is also distinct in its two-celled spores. *Pyrenula leucoplaca* (Wallr.) Koerb. has a very smooth white thallus, thicker than in the preceding species, and the minute perithecia are inconspicuous. It appears to be common on various trees, having been collected in five different localities. *P. leucoplaca* is well-known in northern regions, but its occurrence in Bermuda is noteworthy. Another common and variable *Pyrenula* is *P. nitida nitidella* (Flke.) Schaer., with a thallus varying from olivaceous to brown, and with small perithecia. *P. mamillana* (Ach.) Trev. has a thallus resembling that of the preceding species, but the perithecia are about twice as large.

Anthracothecium tetraspermum Riddle is an endemic species, found by Mrs. Elizabeth G. Britton, growing on the trunk of a palmetto on Devonshire Marsh. It has an olivaceous thallus, which is rough and dull, instead of smooth and shining as in *Porina tetracerae.* The specific name was chosen on account of the brown, muriform spores being constantly four in each ascus. The nearest relative of this species appears to be a plant of the island of St. Thomas in the Antilles.

Family 3. TRYPETHELIÀCEAE.

This family, abundantly represented in tropical countries, has but two species in Bermuda. Both grow on bark, and have the black perithecia confluent in irregular patches: *Melanotheca aggregata* (Fée) Muell. Arg. has a thallus of a brownish tint, while *M. cruenta* (Mont.) Muell. Arg. is a striking species sure to attract attention by its deep red thallus.

Order 2. CONIOCARPÀLES.

Family 1. CYPHELIÀCEAE.

This order has a single, interesting representative in Bermuda, *Pyrgillus cubanus* Nyl. This species has been known previously from the original collection only, made in Cuba by Charles Wright over half a century ago. The Bermuda specimens grew on the same palmetto trunk on Devonshire Marsh, upon which was found the new *Anthracothecium tetraspermum*. *Pyrgillus cubanus* has a dull, olive-brown thallus, with raised, wart-like apothecia, the tops of which are minutely roughened, and red with a darker center. The spores with two globose cells would at once distinguish this species if examined microscopically.

Order 3. GRAPHIDÀLES.

Family 1. ARTHONIÀCEAE.

This is a group of inconspicuous lichens, the crustose thallus being very thin and the minute apothecia irregular in outline. All grow on bark. *Arthonia rubella* (Fée) Nyl. has stellate apothecia, the divisions being linear and wavy, and varying from flesh-color to reddish-brown. (*Sclerophyton elegans* Eschw., although not belonging to this family, has sufficient resemblance to *Arthonia rubella* to mention it here; it may be recognized by its long, flexuous, branched apothecia, which have the fineness of a hair.) *Arthonia conferta* (Fée) Nyl. is a fairly common species, being found most often on the bark of *Melia Azederach*. It is less inconspicuous than the preceding species, on account of the abundant and crowded, dark brown apothecia, which are very irregular in outline but rarely stellate. *A. polymorpha* Ach. may be distinguished from *A. conferta* by the fact that the apothecia are wholly black. *Arthothelium spectabile* (Flot.) Massal. resembles externally *Arthonia polymorpha*, although the apothecia being covered with a whitish bloom are less prominent; under the microscope this species can be recognized at once by its spores, which are divided longitudinally as well as transversely.

Family 2. GRAPHIDÀCEAE.

The species of this family, with a few exceptions, resemble each other very closely, the distinctions among them being based on technical characters, and their determination requiring expert knowledge. In the genus *Opegrapha* the apothecia are more superficial than in any black-fruited species of *Graphis* found in Bermuda. Two of the Bermuda species of *Opegrapha* grow on rocks, and three on bark. The rock-inhabiting species are *O. Chevallieri incarnata* Riddle and *O. ophites* Tuck. The former has a moderately thick thallus, tinged with rose-color, or sometimes fading to coffee-color, and the apothecia are under one millimeter in length; the latter, no visible thallus, and apothecia up to 2.5 millimeters in length. The bark-inhabiting species require examination of the spores in order to distinguish them. In *O. atra* Pers. the spores are four-celled, in *O. vulgata* six-celled, and in *O. Bonplandi* Fée, eight- to ten-celled. The first two have a white or gray thallus; in *O. Bonplandi* it may be whitish, but more

commonly it is olivaceous. *O. Bonplandi* has been found in a number of localities in Bermuda and on a variety of trees.

Graphis Afzelii Ach. is so striking and distinct that it would attract the attention of anyone, having prominent white apothecia of large size (up to 5 mm. long and 1 mm. wide) standing out against the brown thallus. *Graphis scripta* (L.) Ach. and its close allies, *G. Lineola* Ach. and *G. Pavoniana* Fée, all have fine, black apothecia, very variable in length and in the degree of curving and branching; the disk is a mere cleft. *G. striatula* (Ach.) Nyl. closely resembles *G. scripta,* but if the apothecia are examined with a hand-lens, the margins will be seen to be longitudinally furrowed. In *Phaeographis lobata* (Eschw.) Muell. Arg., the apothecia are also black, but the disk is flat and relatively broad. All of these species grow on bark, and are well-known tropical lichens with a wide distribution.

Family 3. CHIODECTONACEAE.

The genus *Chiodecton* is doubtfully represented by a sterile, white, crustose thallus, soft and more or less cottony in texture, found in several localities. This agrees with the thalline characters of *C. Montagnei* Tuck., but as it has not yet been found in fruit, the identity of the plant is uncertain.

Sclerophyton elegans Eschw. belongs to this family, but on account of its resemblance to an *Arthonia* it has been discussed under that genus. It might be taken for a *Graphis* but its violet-brown apothecia are more delicate than in any Bermuda species of *Graphis.*

Glyphis cicatricosa Ach. is another instance of a well-known tropical lichen common in Bermuda. Several apothecia are immersed in a common stroma, the disks being dark brown, flat, and irregular in outline. This is the only lichen in Bermuda having the fruit in a stroma and an open, flat disk.

Order 4. CYCLOCARPÀLES.

Family 1. THELOTREMÀCEAE.

The lichen-flora of Bermuda is of interest not only for the species found there, but also for the absence of species that one would expect. Thus, the families *Trypetheliaceae* and *Thelotremaceae* are well-represented, both as to species and as to individuals, in the West Indies and in the southern United States, yet these families have only two representatives each in Bermuda. *Gyrostomum scyphuliferum* (Ach.) Fr. and *Leptotrema trypaneoides* (Nyl.) Riddle are the Bermuda species of *Thelotremaceae.* Both grow on bark. But they are very distinct from each other and from all other Bermuda lichens. *Gyrostomum* has urn-shaped apothecia, with a comparatively thick, black rim, more or less surrounded by the pale thallus. *Leptotrema trypaneoides* has the apothecia entirely immersed in the thallus and opening by small holes, so that the thallus appears as if perforated with pin-pricks.

Family 2. GYALECTÀCEAE.

Microphiale lutea (Dicks.) Steiner, although common elsewhere, is apparently rare in Bermuda, only a single small specimen having been found on the bark of *Melia* at Tucker's Town. The thallus is very thin

and whitish, and the delicately colored, waxy, discoid apothecia are so small as easily to escape notice. The apothecia resemble those of *Bilimbia Brittoniana,* but the thallus is entirely different.

Gyalecta Farlowi Tuck. is another of the endemic species found on the calcareous rocks. Like the preceding species it is easily overlooked, the minute apothecia being almost immersed in the white thallus.

Family 3. LECIDEÀCEAE.

In this family, a knowledge of the spore-characters is necessary in order to distinguish even the few species found in Bermuda. Those here described all grow on bark.* The most distinctive of these is the endemic *Bilimbia Brittoniana* Riddle, which has a minutely powdery, straw-colored thallus, made up entirely of fine granules, among which are hidden the minute, thick-margined, flesh-colored apothecia. The species is named in honor of Dr. and Mrs. Britton, the original specimens having been collected by Mrs. Britton, along the north shore, where it was growing on *Juniperus.*

The remaining three species resemble each other closely in external appearance, all having a thin thallus and convex apothecia, which vary from flesh-colored or pallid-brown to dark brown. They can readily be distinguished by their spores, since *Biatora fuscorubescens* (Nyl.) Riddle has one-celled spores; *Bilimbia sphaeroides vacillans* (Nyl.) Riddle has short, spindle-shaped spores with four cells; and *Bacidia fuscorubella* (Hoffm.) Th. Fr. has long, needle-like spores with eight or more cells.

Family 4. CLADONIÀCEAE.

Conditions in Bermuda are not favorable for the plants of this family. Few species have been found, and the specimens of these are not altogether typical. There are only two common species. *Cladonia mitrula* Tuck. is a small species, growing on the ground, and always well-fruited, the brown apothecia being borne on slender, simple or sparingly branched stalks, less than one centimeter high. *C. fimbriata* (L.) Fr. is a polymorphic species represented in Bermuda by at least three varieties, in all of which the ends of the podetia are typically cup-shaped. *C. fimbriata simplex* (Weis.) Flot. has short podetia, rarely branched, and with regular cups. The other two varieties, *nemoxyna* (Ach.) Coem. and *borbonica* (Del.) Wainio, are taller and variously branched, with cups more irregular or even absent on some of the podetia; they can be distinguished by the fact that the podetia of the latter variety are much more granulose than is the case in the former. In addition to these two common species, *C. rangiformis pungens* (Ach.) Wainio, with copiously branched podetia, was collected by the Challenger Expedition, but does not seem to have been found since, and *C. pityrea* (Flke.) Fr., a nondescript species, has been found growing with *C. mitrula*, from which it may be distinguished by the scurfy-granulate surface of the podetia, as well as by the occasional occurrence of reduced cups.

* Any resident of Bermuda who could make careful collections of the rock lichens would probably find additional species of Lecideaceae. In the Journal of the Linnean Society of London, volume 14 (1875), Stirton described three such species, but they were based on such fragmentary specimens that they can not be accepted until more is known of them.

Family 5. PYRENOPSIDÀCEAE.

The three species of *Pyrenopsidaceae* are small plants, of a black or blackish-green color, and gelatinous and soft when moist. They are confined to calcareous rocks, and are of interest because they are local in their distribution, evidently being exacting in their requirements. *Psorotichia bermudana* Riddle, an endemic species, has a verrucose ("warty") crustose thallus, broken into small patches. The species of *Omphalaria* have a foliose thallus. *O. cubana* Tuck. has the thallus radiately lobed, one centimeter or less in diameter, and the surface rough and much wrinkled. It has been found only at Castle Harbor in Bermuda, and elsewhere only in Cuba. *O. lingulata* Tuck. has very smooth, tongue-shaped lobes, usually under five millimeters in length. It was collected by Prof. Farlow at Walsingham in 1881, and in the same region by Dr. Britton in 1912.

Family 6. COLLEMÀCEAE.

These are also dark or lead-colored lichens of a gelatinous consistency when moist. *Collema bermudanum* Tuck. and *C. thamnodes* Tuck. are endemic species, forming compact cushions less than one centimeter high, on the calcareous rocks at Walsingham. The former is foliose and bears some resemblance externally to *Omphalaria cubana,* but it is more divided and the apothecia become larger and superficial. *C. thamnodes* is fruticose, which will distinguish it from any of the other gelatinous lichens except *Leptogium tenuissimum,* from which it differs in the granular (isidiose) lobes.* *Collema nigrescens* (Huds.) Ach. and *C. flaccidum* Ach. are quite different from the two preceding species. They are foliose lichens of considerable size, growing on the trunks of trees. *C. nigrescens* has a radiately wrinkled thallus with numerous small apothecia, measuring about one millimeter in diameter, and without any margin. In *C. flaccidum* the thallus is less wrinkled and the apothecia are fewer and about twice as large.

The species of *Leptogium* are paler than those of *Collema. L. tenuissimum* (Dicks.) Koerb. is, perhaps, the most interesting of the Bermuda species. It has a fruticose thallus, the minute, erect lobes being crowded into a crust. It has been found growing on the ground at Paynter's Vale. The material is sterile and *a priori* we should not expect this distinctly northern species to occur in Bermuda, but the thalline characters agree so well that there is not much doubt about the identity of the plant. From the point of view of distribution the next species, *Leptogium marginellum* (Sw.) Mont., presents a striking contrast, as it is a tropical species characteristic of the West Indies and found in the United States only in the tropical portions of the Gulf States. Anyone who has once seen the abundant, minute, cup-shaped apothecia, each with its coronal fringe of delicate lobules, will never have any difficulty in recognizing the plant again. The third and last species of this genus, *Leptogium tremelloides* (L. f.) S. F. Gray, is cosmopolitan in distribution and is one of the commonest lichens in Bermuda, growing on trees of various kinds in many localities. It has a lead-colored thallus,

* *Collema thamnodes* is known only from sterile specimens collected by Professor W. G. Farlow in 1881. It is very desirable that the plant should be found again in the hope of obtaining the fruit and thus completing our knowledge of the species.

variously divided, but with much smoother lobes and larger apothecia than in any other species of this family. Two forms are found: one with abundant apothecia and few lobules, the other sparingly fruited and with the lobes more or less fringed with lobules.

Family 7. **PERTUSARIÀCEAE.**

Pertusaria multipuncta (Turn.) Nyl. belongs to the section of the genus in which the apothecia are replaced by soralia (i. e. powdery pustules). As it is the only species of this section known from Bermuda it will be easily recognized. The only species with which it could possibly be confused is *Pyrine picta*, but that has a foliose thallus, while all species of *Pertusaria* have a crustose thallus.

In the other section of the genus, the apothecia are enclosed in thalline "warts" (verrucae) and resemble the closed perithecia of Pyrenocarpic lichens. Of these species, *Pertusaria tuberculifera* Nyl., with a white thallus, has the largest and finest verrucae, measuring two or three millimeters in diameter. In the other three species, the verrucae are smaller, rarely over one millimeter, and flatter. *P. lutescens* (Eschw.) Krplh. has a yellowish-green coloration to the thallus. In *P. leioplaca* (Ach.) Schaer. and *P. pustulata* (Ach.) Nyl., the thallus is white to gray or brownish; in the former the verrucae are generally constricted at the base and the ostioles are scattered; in the latter the verrucae spread out, gradually merging into the thallus and the ostioles are confluent and sometimes appear single.

Pertusaria tuberculifera and *P. lutescens* are tropical lichens; the others are widely distributed. All grow on bark.

Family 8. **LECANORÀCEAE.**

This family is characterized by a crustose thallus and discoid apothecia furnished with a margin colored like the thallus and usually contrasting with the disk.

Haematomma puniceum (Ach.) Wainio will be easily distinguished from all other Bermuda lichens by the bright red disk of the apothecia, set on a gray thallus. It is a common tropical species, growing on bark.

Five rather closely related species of *Lecanora* have been found in Bermuda, on bark or old fences. *L. pallida* (Schreb.) Schaer. is the easiest of recognition on account of the dense white "bloom" covering the flesh-colored disk of the fruit. The other four species, all lacking this bloom, are more difficult to distinguish, as their separation depends mainly upon the color of the apothecia and this is a variable character. Plants with a greenish disk may be assigned to *L. varia* (Hoffm.) Ach.; with the disk blackening to *L. bermudensis* Nyl.; those with the disk decidedly brown, to *L. subfusca* (L.) Ach.; while those with the disk more or less flesh-colored or pallid belong to *L. cinereocarnea* (Eschw.) Wainio. The last named is the most abundant of the species of this genus; it varies much in the character of the thallus, from a thick, wrinkled thallus to a form in which the thallus is entirely absent.

Family 9. **PARMELIÀCEAE.**

The genus *Parmelia*, with foliose thallus, requires for its development more favorable conditions than occur in Bermuda. Consequently, it is

poorly represented there, only three species, that can be identified with certainty, having been found, and these only in sterile specimens. *Parmelia tinctorum* Despr. is distinct in the isidia (tubercles) growing on the surface of the thallus. *P. perlata* (L.) Ach. and *P. latissima cristifera* (Tayl.) Hue are more difficult to separate; the latter is generally whiter, with broader lobes. and larger soredia.

Family 10. **USNEÀCEAE.**

In discussing the Thelotremaceae, certain striking gaps in the lichenflora of Bermuda were noted. In the family Usneaceae we find another such case. The family, commonly abundant in all regions, has but a single representative in Bermuda, *Ramalina complanata* (Sw.) Ach. This is, however, one of the commonest of Bermuda lichens, growing on the branches of trees, and easily recognized by its much branched, tuberculate thallus.

Family 11. **BUELLIÀCEAE.**

Buellia parasema (Ach.) Th. Fr. is a cosmopolitan lichen, which is common in Bermuda, especially on the cedar; it has a crustose thallus, which sometimes disappears almost entirely, and flat black apothecia with a persistent black margin, this last character serving to distinguish it from the next two species, in which the apothecia are, except when very young, convex and marginless. *Buellia myriocarpa* (DC.) Mudd and *Rinodina insperata* (Nyl.) Zahlbr. resemble each other in general appearance; in the latter, however, the apothecia when moist are brown rather than black, and the spores are of the peculiar type known as polar-bilocular. These two species, although growing on bark like *Buellia parasema,* are comparatively rare.

There have been collected from a roadside wall at Devonshire, specimens of a small, chalky lichen, with a whitish subfoliose thallus and radiate, confluent lobes. No fruit has been found, so the plant can not be determined with certainty, but the thalline characters agree exactly with those of *Buellia canescens* (Dicks.) DeNot., which is very common on the same habitat in England. As the species is entirely unknown in America, the interesting possibility suggests itself of this species having been introduced into Bermuda from England.

Family 12. **CALOPLACÀCEAE.**

Blastenia floridana (Tuck.) Zahlbr. is a minute, inconspicuous lichen. It might be confused with *Lecanora subfusca,* but the disk is commonly darker, and the spores are two-celled.

Family 13. **PHYSCIÀCEAE.**

This family includes three species very common in Bermuda, and two that are less known there. All have a grayish, foliose thallus, and may grow on rocks as well as on trees. In the cosmopolitan *Physcia stellaris* (L.) Nyl., the thallus has radiating, convex lobes, without soredia. *P. alba* (Fée) Muell. Arg. is also without soredia, but has flat lobes. In the other three species, the thallus is more or less sorediate (powdery). *P. crispa* (Pers.) Nyl. has broad lobes, with the soredia confined to the

margins. *Physcia integrata sorediosa* Wainio and *Pyxine picta* (Sw.) Tuck. agree in having narrow lobes, with the soredia in soralia (powdery pustules); but in the latter the thallus is more closely appressed to the substratum and has confluent lobes.

SUMMARY OF GEOGRAPHICAL AFFINITIES.

The results of an analysis of the geographical range of the species making up the lichen-flora of Bermuda may be shown in the following table:

Endemic	10
Occurring in the West Indies or Tropical South America, but not in the United States	14
Occurring in the West Indies and also in the southern United States	29
Occurring in the southern United States but not in the West Indies.	0
Widely distributed in the Temperate as well as in the Tropical Zone	21
Typically northern species not known in Tropical regions	4

(Note: The difference in the total number given here and in the introduction is due to the omission of certain unimportant varieties.)

An inspection of the table will show clearly that the lichen-flora of Bermuda is most closely related to that of the West Indies. The relatively northern position of the islands, however, permits of the growth of four species of colder countries, that are not found in the West Indies. Finally, the peculiar conditions existing in Bermuda have resulted in a comparatively large number of endemic species.

Class 2. FUNGI.

Moulds, Blights and Mushrooms.

Contributed by Fred J. Seaver.

INTRODUCTION.

The fungi, which are more commonly known under such names as puffballs, mushrooms, mildews or moulds, constitute a group of plants which are represented in the entire world by more than fifty thousand species. They are often referred to as degenerate plants, the term degenerate being applied more on account of their habits of life than because of their simplicity of structure, for while many of them are simple, many others show much complexity in general structure as well as in their reproductive processes.

Probably the inability of the fungi to manufacture their own food, as is done by the higher green plants, together with the fact that many of them are small and grow in out of the way places, often living as scavengers on decaying matter, has done more to cause them to be looked upon as degraded forms of vegetation than any simplicity or peculiarity of structure. Whether as a cause or a consequence, the fungi are entirely devoid of green coloring matter or chlorophyll, and are therefore dependent upon

other plants or animals for their food. On account of this fact, the fungi are often popularly divided into two groups, (1) saprophytes or those which feed upon dead matter, and (2) parasites or those which feed upon living animals or plants.

SAPROPHYTIC FUNGI.

Saprophytic fungi may be found growing on dead leaves, twigs, humus, the dung of animals, and in fact in almost any situation where there is a supply of decaying organic material. While these fungi may often attain a size of more than a foot in diameter, many others are so small that they are never seen by the casual observer and their collection even by the trained expert requires much time and patience.

The larger forms are often extensively used as articles of food, being highly esteemed on account of their flavor as well as for their nutritive value. But on account of the poisonous properties of many of the species the entire group is often looked upon with suspicion by the amateur collector. Even the smaller and more inconspicuous forms play an important part in the scheme of nature, being one of the most active agents in bringing about the decay of organic matter, without which the surface of the earth would become covered over with the litter of dead animals and plants.

PARASITIC FUNGI.

The parasitic fungi are of unusual economic importance because of their relation to the diseases of the higher plants. They may attack the leaves, stem, or almost any part of the living plant, causing a slight retardation in growth or the death of the entire plant. The amount of damage caused each year to cultivated plants by such fungi is enormous. Fungi may also occasionally attack the bodies of living animals, including man, although the number of such cases, except bacterial diseases, are comparatively few. Parasitic fungi are sometimes made use of in combating harmful insects. The bacteria of Bermuda have not been studied.

STRUCTURE AND REPRODUCTION.

The fungi in the course of their life histories exhibit two distinct phases, the vegetative or growing stage and the reproductive stage. The vegetative stage of most true fungi consists of a mass of minute threads known as mycelium or spawn. The simpler types of fungi consist of little more than a mass of such mycelium. The reproductive stage, however, may show considerable complexity of structure, especially in the higher forms. The reproductive bodies themselves are known as spores and are so minute in size that they are usually invisible to the unaided eye except where they are present in great numbers. Functionally the spores of the fungi correspond to the seeds of the higher plants.

DISTRIBUTION.

On account of their minute size the spores of the fungi may be carried great distances by the wind and other agents. While the wind is probably the chief agent in the distribution of the spores, a few species show special adaptation for insect distribution.

In addition to their minute size, the spores of the fungi have been shown to be able to keep their viability for several years under the most adverse conditions. These facts will probably go far to account for the wide distribution of many species of fungi, they being more cosmopolitan in their distribution than almost any other group of plants. This being the case we would naturally expect the fungous flora of an isolated region such as Bermuda to be proportionately larger than that of the higher plants, as seems to be the case so far as can be judged from the limited observations made.

The number of species occurring in any region would be limited, however, by the food supply, and since the fungi depend largely upon the higher plants for their food, a region which contains a comparatively small number of higher plants would of necessity show a relatively small number of fungi since even the saprophytic fungi are often very selective in their food habits.

It is difficult to account for the occurrence of a number of European species of fungi in Bermuda which have not been found elsewhere in North America. If they had been introduced through the agency of man, it is difficult to understand why they have not been introduced into the mainland of North America as well. This apparent discrepancy might be accounted for by the incompleteness of our knowledge of the fungi of our own states, owing largely to the minute size of the plants and the ease with which they are overlooked.

SYSTEMATIC ARRANGEMENT.

The fungi, like other plants, are divided into a number of main groups and each group again subdivided into orders, families, genera and species. This arrangement is based entirely upon those structural characters which show natural relationship without regard to their habits of life, so that the same group may contain either parasitic or saprophytic species or both. In fact the same species may in exceptional cases appear either as a parasite or as a saprophyte.

In the present discussion, the fungi will be taken up in accordance with their systematic arrangement, especial attention being given to those species which are the cause of serious plant diseases.

Local Work in Bermuda.

The fungous flora of Bermuda has probably received less attention than any other phase of the natural history of the islands, largely through the misapprehension that there are few fungi there. While it is true that the larger forms of fungi seem to be poorly represented from our own brief experience the writer is inclined to believe that the number of species of fungi occurring in Bermuda will eventually be found to be surprisingly large.

The first list of which we have any record is that of the Challenger Expedition of 1873, in which twenty-four species were recorded. Professor Farlow in the course of his visits to the islands has collected and described a few additional species. About forty species were collected by Dr. and Mrs. B. O. Dodge in 1911, the largest collection of which we have any knowledge up to that date. Scattering species have frequently been brought in by collectors of flowering plants, including members of the staff of the New York Botanical Garden.

In August, 1916, the writer published in the *Memoirs of the New York Botanical Garden* a list of all of the species of fungi from Bermuda of which we have any authentic record. The list included one hundred and twenty species and a number of varieties. Most of the species listed here were collected during a two-weeks' visit (November 29–December 14, 1912). The fungi are so evanescent in their occurrence that it is impossible to form an adequate conception of the number of species occurring in any locality in so short a time, so that this list must be considered extremely incomplete.

Sub-class 1. **MYXOMYCÈTES.**

Slime-Moulds.

The slime-moulds comprise a group of living organisms of doubtful affinity, but which on account of the fungus-like structure of their fruiting stage are often included with the fungi. Although they are usually considered as plants, some students even go so far as to regard them as intermediate between the animal and plant kingdoms.

These organisms receive their name "slime-mould" from the fact that their vegetative or growing stage takes the form of a slimy mass. This mass varies much in color according to the species, white, pink, and yellow being most commonly encountered. That this slimy mass is really living matter is shown by the fact that it possesses the ability to move about by a streaming motion. It is this property which suggests their affinity with certain lower forms of animal life.

Like the true fungi, the slime-moulds are unable to make their own food and must feed either on dead or living organic matter. The vegetative stage of the slime-mould usually grows hidden from view where it quietly feeds on the decomposing organic matter of plant and animal remains. Through some natural impulse, however, they almost invariably come to the surface before producing their fruit and often even climb on surrounding objects to considerable height. This is a decided advantage to the plants since it enables them to bring about a wider distribution of their spores which, as in true fungi, is accomplished mainly by the wind. In some species, the vegetative stage consists of a mass several inches or rarely a foot or more in diameter, and such a mass will frequently climb several feet directly up the trunk of a tree or other object before maturing its spores. Rotten logs, leaves, twigs, blades of grass, and in fact almost any available object will furnish a suitable substratum on which these plants may produce their fruit.

While the slime-moulds in their vegetative stage resemble some of the lower forms of animal life, in their fruiting stage they are decidedly plant-like and show a close resemblance to the fruiting stage of the fungi. The remains of the old fruiting bodies will often be found in clusters on rotten logs and resemble minute feathers or plumes, varying in color from brown to red or golden-yellow. Still others take the form of small puffballs.

A number of species of *Stemonitis, Arcyria, Hemitrichia* and *Physarum* have been collected in Bermuda. In addition to these, *Lycogala epidendrum*, one of the puffball-like species, has been several times collected. The latter in its vegetative stage is of a delicate pink color which varies to bronze as the fruiting body matures. So far as is known, no attempt has

been made to study the Bermuda species of this group critically. Such a study by some resident botanist would doubtless yield interesting results.

Sub-class 2. PHYCOMYCÈTES.

The Phycomycetes are often known as the algal-fungi because of their resemblance to certain of the lower algae or seaweeds. Some of the species are aquatic and most of them require a very moist habitat, often producing spores which are able to swim about in water. The fish-mould which often causes epidemics among fish belongs to this group.

To this group of fungi also belong the so-called white rusts which occur as parasites on the leaves and stems of various kinds of plants. They are called white rusts because the spores form white blisters on the leaves and stems of the host plant, the blisters resembling in form those of the true plant-rusts which will be considered later on.

Many of the white rusts are very destructive parasites, and while all of the species are parasitic, many of them occur on plants which are of no economic importance or are not serious enough to cause any great damage. Only one species of white rust has been collected in Bermuda so far as is known. This is *Albugo candida*, a parasite which attacks the leaves and stems of plants belonging to the Mustard Family. The Bermuda species was collected on the stems and leaves of the cultivated radish.

Another fungus which belongs to the Phycomycetes is the *Mucor* or common bread-mould. Specimens of one species of this genus were found abundantly on richly fertilized soil.

Still another Phycomycete found in Bermuda is *Pilobolus crystallinus*, a minute fungus which grows on the dung of animals. This fungus is provided with an explosive apparatus by means of which the spore-caps may be thrown some distance into the air. The entire cap which is about the size of a fly-speck is often found adhering to the stems and leaves of surrounding plants. Since the spores of many species of fungi which grow on the dung of animals are able to pass through the body of the animal and keep their viability, it is not unlikely that the spores of this species behave in this manner. The adhesive device may be an adaptation for placing the spores where they may be eaten by cattle and other herbivorous animals. After passing through the body of the animal they are then ready to resume growth.

Order 1. PERONOSPORÀLES.

A single species belonging to this order has been recorded, the white rust named above.

Order 2. MUCORÀLES.

Two species belonging to different genera have been collected in Bermuda one of which is listed above.

Sub-class 3. ASCOMYCÈTES.

The Ascomycetes represent a very large group of fungi of extremely varied habits. Many of the plants of this group are parasites and some of them very destructive, while many others live a retiring sort of life a

mere saprophytes and thus escape popular notice. The fruiting bodies vary in size from those which are scarcely visible to the unaided eye to more than a foot in diameter.

The group is characterized by having their spores borne in closed receptacles which are known as spore-sacs or asci, the number of spores in each being very constant and varying in the following ratios: two, four, eight, sixteen, thirty-two, etc. In many cases the spores at maturity are forcibly extruded from the ascus like shot from a gun, and in such numbers as to appear to the unaided eye like a cloud of smoke. They are then caught up by the wind and widely disseminated so that the atmosphere is never free from some of these minute bodies.

One of the groups of Ascomycetes which is usually well represented in tropical and subtropical regions is that commonly known as the sooty moulds. These plants receive their name from the sooty appearance of the superficial mycelium which overspreads the substratum often for several inches. The plants of this group are for the most part epiphytic, that is they grow on living plants without actually drawing their nourishment from them. They usually feed upon the remains or excretions of minute insects such as plant-lice, which in turn suck their nourishment from the tissues of the plants on which they live. The fruiting bodies consist of minute subglobose perithecia scarcely visible to the unaided eye which in turn contain the asci and spores. Many of the specimens collected in Bermuda did not show mature perithecia and for this reason their identity is uncertain. Several mature specimens belonging to the genera *Meliola, Dimerosporium* and *Asterina* were collected in Bermuda.

The Pyrenomycetes constitute a very large group of Ascomycetes which also have their asci borne in closed or nearly closed perithecia, the sooty moulds being often included with this group. The fruiting bodies of the Pyrenomycetes are usually black, which has suggested the name. In a few of them, however, the fruiting bodies are bright-colored. One of the latter is *Cordyceps,* a fungus which grows on dead insects or their pupae and of which one species has been collected in Bermuda. Whether these fungi attack the insect while living there is some difference of opinion, but it is not unlikely that they do. About thirty species belonging to the Pyrenomycetes have been collected in Bermuda. Most of the species collected are saprophytes and of no especial interest from an economic point of view.

Still another group of Ascomycetes of considerable size is known as the Discomycetes or cup-fungi. As implied by the name, a large number of the plants of this group are cup-shaped and vary in size from that of a pin-head to the size of a tea cup, or in rare cases even a foot in diameter.

While most of the Discomycetes are cup-shaped, some are club-shaped or spathulate. To the latter belong the smooth and hairy earth-tongues, several species of which have been collected and, in fact, found to be quite common in Bermuda. The plants grow on damp soil or among mosses, are black in color, and reach a height of several inches. It is because of their flattened form that they have come to be popularly known as "earth-tongues."

Of the true cup-fungi the species *Lamprospora Planchonis,* a small purple cup-fungus sometimes reaching a size of nearly an inch in diameter

and occurring everywhere by roadsides, is the commonest species in the islands. So far as known this species has not been found elsewhere in North America having originally been described from Europe. None of the very large species have been collected in Bermuda, although they are likely to be found to occur there.

Probably the most abundant collections of Discomycetes made in Bermuda consisted of those species, usually small, which occur on the dung of animals. In addition to a number of the common species, one, *Ascophanus bermudensis*, has been described as new and is known only from Bermuda.

Another species of considerable interest is *Pyronema omphalodes* which forms pink masses on burned places. So far as known, this plant occurs in nature only on ground which has been heated by burning. In greenhouses it occurs on soil which has been steamed or heated in some other manner. The fungus is probably world-wide in its distribution and has attracted a great deal of interest. Actual experiment has shown the spores to be able to keep their viability for nearly three years under the most unfavorable conditions. This and the ease with which the spores are disseminated will probably account for the occurrence of this and other similar species in Bermuda with its conditions of isolation.

Still another species which is attractive and interesting is *Pithya Cupressi*. The species forms great numbers of fruiting discs about an eighth of an inch in diameter on recently killed foliage of Bermuda cedar. While the fungus appears to be a saprophyte, it is possible that the mycelium attacks the trees while living, producing its fruit after the branches have died. While the plants were collected but once in Bermuda, they were found in large quantities.

Order 3. PERISPORIÀLES.

This order includes the sooty moulds of which the following species have been collected and named: *Dimerosporium melioloides* (Berk. & Curt.) Ellis & Ev. on the living leaves of *Baccharis; Meliola Cookeana* Speg. on the leaves of *Lippia; Meliola circinans* Earle on the leaves of saw-grass and *Asterina pelliculosa* Berk., the last being reported by the Challenger Expedition on coffee leaves.

Order 4. HYPOCREÀLES.

Family 1. NECTRIÀCEAE.

Of this family the blood-red fungus, *Nectria sanguinea* (Bolton) Fries has been collected, also *Sphaerostilbe flammea* (Berk. & Rav.) Tul., the latter being associated with scale insects. Three endemic species have also been described by the writer, *Nectria Lantanae* Seaver, *Calonectria Umbelliferarum* Seaver and *Calonectria granulosa* Seaver.

Family 2. HYPOCREÀCEAE.

Three species of this family have been collected, *Cordyceps militaris* (L.) Link on pupae of insects; also *Hypocrea patella* Cooke & Peck and *Stilbocrea hypocreoides* (Kalch. & Cooke) Seaver, the last two on decaying wood.

Order 5. FIMETARIÀLES.

Some of the species of this order occurring in Bermuda are: *Fimetaria fimicola* (Rob.) D. Griff. & Seaver; *Pleurage fimiseda* (Ces. & DeNot.) D. Griff., *Sporormia minima* Auersw. and an unnamed species of *Chaetomium*. All occur on the excrement of animals.

Order 6. SPHAERIÀLES.

This is a large order and well represented in Bermuda. One of the most common species is *Rosellinia subiculata* (Schw.) Sacc., a species forming small black knobs on rotten wood and occurring on a large variety of substrata. *Xylaria filiformis* (Albert. & Schw.) Fries was also found to be abundant on dead leaves and *Poronia Oedipus* Mont. on the excrement of cows. The last named species is rather conspicuous and attractive. Several species of *Hypoxylon* were also collected, the plants of the genus forming black crusts on decaying wood and other substrata.

Order 7. HELVELLÀLES.

This order includes the "earth-tongues" of which *Trichoglossum hirsutum Wrightii* Durand and *Geoglossum nigritum* Cooke are the most common both occurring on rocky moss covered hillsides.

Order 8. PEZIZÀLES.

This order which is a very large one contains the true cup-fungi of which about twenty identifiable species have been collected. Among these the hairy cups, *Lachnea pulcherrima* (Cr.) Boud. and *Lachnea theleboloides* (Albert. & Schw.) Gill. are found to be common on the excrement of cows. *Ascophanus granuliformis* (Cr.) Boud., *Ascobolus stercorarius* (Bull.) Schroet., *Ascobolus immersus* Pers., *Saccobolus Kerverni* (Cr.) Boud., *Lasiobolus equinus* (Muell.) Karst. and *Thecotheus Pelletieri* (Cr.) Boud. also occur on the dung of different animals. Among the wood-inhabiting species are *Gongoniceps Pumilionis* Rehm, *Dasycypha caroleuca* Berk. & Br., *Patellaria atrata* (Hedw.) Fries and *Karschia lignyota* (Fries) Sacc., the last two resembling lichen apothecia.

Order 9. HYSTERIÀLES.

The black boat-shaped fruiting bodies of the fungi of this order are usually found on rotten wood. Two species were found to be common, *Gloniopsis lineolatum* (Cooke) Sacc., and *Hysterographium praelongum* (Schw.) Sacc.

Order 10. PHACIDIÀLES.

The plants of this order resemble those of the preceding but are not always black. Three species have been collected, *Propolis faginea* Schrad.) Karst., *Stictis radiata* (L.) Pers., and *Stictis graminum* Desm.

Sub-class 4. BASIDIOMYCÈTES.

The Basidiomycetes also comprise a very large group of fungi of varied form and habits. Unlike the Ascomycetes, the spores of the Basid-

iomycetes are never borne in closed sacs but are borne externally on little stems like miniature clusters of cherries or other fruit. Several devices also occur for ejecting the spores with force which greatly facilitate the matter of distribution.

One important subdivision of the Basidiomycetes is that known as the plant rusts, the term "rust" referring to the color of the spores in some of the species. The rusts are all parasitic and from an economic point of view occupy a high place among parasitic fungi. Unlike most parasites the rusts have several distinct stages in their life cycles and the different stages often occur on different host plants. Such parasites are known as heteroecious parasites.

The common grain rust which, although it is not at present known to occur in Bermuda, is likely at any time to be found there, is one of the most important of the plant rusts. The early or spring stage of this rust occurs on the leaves of the barberry bush. The spores produced here cannot reinfect the leaves of the barberry but germinate readily on the leaves and stems of the common grains, both the summer and winter stages being produced on the same host. Two different plants are then made use of in order to enable the fungus to complete its life cycle. It has been repeatedly shown, however, that this fungus can thrive in countries where the barberry is unknown, so that this host is not absolutely necessary to the life of the fungus. Just how the rust is carried over without the presence of this host is a question that has never been very satisfactorily answered.

Nine species of plant rusts have been collected in Bermuda, occurring on about twelve different hosts, some of which are of no particular economic importance. The rust of *Sorghum* and that of cultivated peaches are likely to be of some economic importance. Additional species may be expected to appear in Bermuda as the work of agriculture and horticulture becomes more extended in the islands. While only nine species have been collected, it is not unlikely that more occur but have escaped notice.

Among these is a cedar rust known as *Gymnosporangium bermudianum*, a species which is related to our own cedar-apple rust, affecting red cedar and cultivated and wild apples, and causing great losses where apples and cedars are cultivated in close proximity. The cedar rust occurring in Bermuda apparently causes little or no damage.

Another group which is usually included with the lower Basidiomycetes are the smuts, so-called because of the black mass of spores which are formed usually associated with the flowers or fruit of the host. The only species observed in Bermuda is the common corn-smut, a species which causes great losses wherever maize is extensively cultivated. This is one of the parasitic fungi, however, which can be easily controlled by the application of the principles of scientific agriculture.

The Basidiomycetes contain those forms known as puffballs, toadstools and mushrooms, many of which are commonly used as articles of food. While some edible species were collected in Bermuda, they were found only sparingly and whether these occur in sufficient quantity to be of practical use, it is difficult to say; although they are likely to be abundant during periods of excessive rainfall.

Among the puffballs the only species collected was one of the earthstars, *Geaster saccatus*. The earthstars differ from the other puffballs in

that the outer peridium splits star-like and folds back, elevating the fruit body in such a way as to aid in the distribution of the spores.

The Basidiomycetes also include the woody fungi which occur on the trunks of trees and are often the source of great damage by causing heart rot. The number of such species found in Bermuda was surprisingly small, perhaps on account of the small number of kinds of native host plants.

Order 11. USTILAGINÀLES.

The smuts, which belong to this order, are often included with the lower Basidiomycetes. One species has been found in Bermuda, *Ustilago Zeae* (Beckm.) Unger, a very destructive parasite.

Order 12. UREDINÀLES.

Some of the species of plant rusts belonging to the present order occurring in the islands are: *Nigredo proeminens* (DC) Arthur occurring on leaves of *Poinsetta* and various species of *Chamaesyce*, and *Nigredo Medicaginis* (Pass.) Arthur on the leaves of *Medicago denticulata*. Other species are: *Puccinia Lantanae* Farlow, *Puccinia Dichondrae* Mont., *Puccinia Cladii* Ellis & Tracy, *Puccinia Polygoni-amphibii* Pers. and *Puccinia purpurea* Cooke. *Tranzschelia punctata* (Pers.) Arthur occurs as a parasite on the leaves of cultivated peach.

Order 13. AGARICÀLES.

This order contains the edible mushrooms. Among the endemic species are: *Agaricus alphitophorus* Berk., *Agaricus helictus* Berk., *Marasmius bermudensis* Berk., *Marasmius Sabali* Berk., *Marasmius praedecurrens* Murrill, *Pleurotopsis niduliformis* Murrill and *Tyromyces graminicola* Murrill. In all thirty species of the order have been recorded.

Order 14. AURICULARIÀLES.

One endemic species belonging to this order has been collected, *Hirneola coffcicolor* Berk.

Order 15. LYCOPERDÀLES.

The earthstar named above is the only representative of this order.

Order 16. PHALLÀLES.

A single species belonging to the genus *Clathrus* has been collected but was in such poor state of preservation that it could not be determined.

Imperfect Fungi.

In addition to the main groups of fungi, there are a large number of species which are thought to represent stages in the life cycles of other fungi, especially the Ascomycetes. These are included in the group commonly known as the Imperfect Fungi, since their histories are imperfectly known. Fourteen species of such fungi collected in Bermuda have been named. Many of these occur as parasites and are the cause of serious leaf and stem injury. One species, *Helminthosporium Ravenelii*, forms its

spores in a black mass over the flowers of its host, one of the grasses. On account of the large size of the spores, the fungus is very beautiful and the large masses of spores render it a very attractive species.

Order 17. SPHAEROPSIDÀLES.

Among the fungi of this order are the leaf-spots, a number of which have been collected. Some of the species are: *Septoria oleandrina* Sacc., *Phyllosticta Opuntiae* Sacc. & Speg., *Phoma Musarum* Cooke and *Pestallozzia Guepini* Desm.

In addition to these a number of Hyphomycetes have been collected among which are: *Macrosporium Solani* Ellis & Martin, *Sclerotium Semen* Tode and *Helicoma larvula* Morgan.

In order to make a careful survey of the fungi of any region, it is necessary to study the region not only through the season but for several seasons, since many of the fungi are not persistent as are the higher plants. Many of them last for only a few days at most, and in some cases may not appear again for years. The best means of securing a complete knowledge of the fungi of Bermuda is for some permanent resident to take up a study of the group and continue it indefinitely. Such a study would not only furnish interesting occupation, but would extend our local knowledge of the fungi and doubtless result in adding many species to those already known.

Class 3. ALGAE.*

Contributed by Marshall A. Howe.

The shores of Bermuda and the adjacent sea-bottoms offer wider areas and doubtless more diversified conditions for the growth and development of plants than do the parts of Bermuda that are permanently above the sea. It is probable that thorough investigations will show that, even when the microscopic diatoms, not especially numerous here, are excluded, the number of species of marine plants of Bermuda and vicinity is equal to that of the seed-bearing plants of the dry land. Many of the organisms that first attract the eye in the famous "sea gardens" of Bermuda, such as the corals, the sponges, and their relatives, are members of the animal kingdom, though it is not surprising that the earlier naturalists, observing these organisms to be attached, like the undoubted plants of the land and sea, were inclined to look upon them as plants. And it is not surprising that this idea, as regards some of these organisms, has now and then persisted, with those who have never made a special study of such things, even down to the present day.

Of the marine plants that wash ashore in Bermuda, especially after a severe storm, and that are commonly referred to as "seaweeds," a few are seed plants belonging to such genera as *Thalassia*, the Turtle Grass; *Zostera*, the Eel Grass; and *Cymodocea*, the Manatee Grass. However, most of the plants found in the beach drift or seen growing near the line of the low tide or in deeper water, are less highly organized, non-vascular plants, and are representatives of the large and much diversified group known to botanists as the algae. Probably by reason of the more scorch-

* Chiefly marine, as represented in Bermuda and as here treated

ing effects of the sun's rays, the algae are less conspicuous between the tide lines in the warmer parts of the earth than in many of the colder parts. In this respect, as also in the genera and species that are represented, Bermuda has more in common with Florida and the West Indies than with the northern United States and Great Britain. The direct physical connection with more southern shores by the northward-flowing Gulf Stream and the more or less similar conditions as to illumination and water temperatures are doubtless the main factors in determining the obviously marked affinity between the marine flora of Bermuda and that of the Antillean region. A certain number of species of marine algae—a number that seems to increase rather than diminish as a result of critical study—is, so far as is now known, peculiar to Bermuda; other species occur also on the North Atlantic coasts of the American continent; others, again are found also on the shores of Europe, the Azores, the Canary Isles, etc.; but to still larger degree the algae of Bermuda appear to be identical in species with those of the Bahamas, southern Florida, and the Greater Antilles.

The marine algae of Bermuda have received a considerable amount of attention from naturalists. One species and one variety reached the hands of Dawson Turner and were described by him in the first volume of his classic Historia Fucorum, published in 1808. Four principal lists of Bermudian algae have been published up to the date of writing, all of which are referred to in the general bibliography. In the first of these, by Alexander F. Kemp, published in 1857, seventy-one species of marine algae are named and others are referred to the genus only. In the second, by Johannes Justus Rein, published in 1873, the number enumerated is one hundred and nine. In the third, published in the report of the Challenger Expedition in 1884 and based in a considerable part on the two lists already mentioned, one hundred and thirty-two species are named as occurring in these islands.

But by far the most complete list of Bermuda algae ever published is contained in a paper on "The Algae of Bermuda" by F. S. Collins and A. B. Hervey, which has appeared just as the present work is going to press and in which 410 species are recognized. Collections of algae have been made in Bermuda by one or both of the authors of this recent important paper at all seasons of the year, and 250 numbers of dried specimens of Bermuda algae have been distributed by them in the Phycotheca Boreali-Americana of Collins, Holden & Setchell. In the following discussion of the marine flora these specimens are often cited under the abbreviation "Phyc. Bor.-Am." In addition to these specimens, the writer has had access to a considerable amount of material, both dried and in fluid, generously supplied to the New York Botanical Garden by Mr. Collins, and also to a collection of 329 numbers, both dried and in fluid, made by the writer during a single four weeks' visit to Bermuda in the summer of 1900, as well as to a number of specimens collected and distributed by Professor W. G. Farlow, Professor Herbert M. Richards, and others. In view of the very recent appearance of the Collins & Hervey list and in view of the more limited material at the disposal of the present writer, no attempt to offer a complete list of species will be made in the following pages. An effort will be made, however, at least to mention the more common and more conspicuous algae occurring in the islands, with remarks,

sometimes diagnostic or semi-diagnostic, on some of the more characteristic species.

Among the algae as a whole, as the term is commonly restricted by modern writers, three great sub-classes are recognized, known as the Chlorophyceae, or the Green Algae, the Phaeophyceae or Brown Algae, and the Rhodophyceae or Red Algae. The algae in general possess more or less chlorophyl, the green pigment characteristic of most of the higher plants, and in the sub-class Chlorophyceae, the chlorophyl is as a rule comparatively free from admixture with other coloring matters, so that the plants impress one as being more or less grass-green in color. In the sub-class Phaeophyceae, the chlorophyl is accompanied by one or more brownish or yellowish pigments and the resulting color is commonly a brownish green or an olive-green. In the sub-class Rhodophyceae, the chlorophyl is ordinarily masked or obscured by a red pigment, so that the plants usually exhibit some shade of red, pink, violet, or purple, though in certain kinds the shade is so dark as to be almost black. Associated with these color differences as exhibited by these three sub-classes, and perhaps of more fundamental import, are certain differences in structure and in modes of reproduction. But the determination of these characters involves, as a rule, the use of the higher powers of the microscope and they have been referred to only occasionally in the discussion that follows.

Sub-class **CYANOPHYCEAE**.

In addition to the three classes of plants mentioned in the preceding paragraph, the term algae is very often extended to include also another, somewhat simpler class known as the Cyanophyceae or Myxophyceae, commonly referred to as the Blue-green Algae, a group that exhibits points of contact, on the one hand, with the Bacteria and, on the other hand, with the simplest Red Algae. In this group, the chlorophyl is associated with another pigment which commonly gives the cell contents a bluish-green shade, though in mass, to the naked eye, the plants very commonly appear nearly black. They are usually plants of small size but when associated in colonies as is their ordinary habit, they form masses that may readily attract the eye. In many of them reproductive processes are so little differentiated from those of ordinary vegetative growth that it is difficult to say just what should be considered an individual plant and what an aggregation of individuals. In some of them the single microscopic cell is more or less obviously the individual; in certain others it is a filament, made up usually of a single row of cells. The Cyanophyceae are wholly non-sexual in their modes of multiplication. In the simpler forms the multiplication of individuals occurs through simple division or fission; in the higher, certain cells, known as spores or resting cells, differentiated from the ordinary vegetative cells in size and other characters, take upon themselves the function of originating new individuals. The Cyanophyceae may form gelatinous or slimy dark scums on rather stagnant water or somewhat similar films or crusts on rocks or on the larger aquatic plants,

either between the tide lines or permanently submerged. They are not confined to the sea, but are perhaps even more common in brackish or fresh water. They also occur on moist ground and even on trunks of trees and rocks where rains and atmospheric moisture are their only sources of water-supply. A few of the species of Cyanophyceae that have been found in Bermuda may be mentioned:

Family CHROOCOCCÀCEAE.

Chroococcus turgidus (Kütz.) Naeg., a minute one-celled, more or less colonial plant, occurs in brackish pools, commonly associated with other small Cyanophyceae.

Chroothece Richteriana Hansgirg, forms verdigris-green or dark blue-green gelatinous cushions or crusts on rocks, sometimes at a considerable distance from the sea, as in Church Cave.

Chroothece cryptarum Farlow, of somewhat similar appearance to the naked eye, also forms crusts or films on rocks in caves, as at Agar's Island.

Gloeothece rupestris (Lyngb.) Bornet, another unicellular form, occurs as a dark or bluish olive-green gelatinous film on moist ground, as at Spanish Point.

Family OSCILLATORIÀCEAE.

Oscillatoria amphibia Ag., a filamentous plant, forms gelatinous masses in brackish pools, often associated with other species of the same genus or class. Several other species of the genus occur in Bermuda. This genus receives its name from the fact that the filaments in a living condition show slow swaying movements, visible under a compound microscope.

Lyngbya majuscula (Dillw.) Harv., sometimes known as Mermaid's Hair, forms conspicuous slimy intricate mats or tufts that may vary in color from bluish green to blue-black. The individual threads are easily visible to the unaided eye and seem sometimes to attain a length of several inches. It flourishes best in salt water that is little disturbed, as in the ponds of Walsingham and in the tide-pools of St. David's Island.

Lyngbya confervoides violacea Collins, has been found by Collins to occur in a small pond near Harrington Sound, where it forms a reddish film on decaying algae, in company, it is said, with *Lyngbya lutea* (Ag.) Gom. and *L. semiplena* (Ag.) J. Ag.

Microcoleus chthonoplastes (Mert.) Thuret, representing a genus in which numerous filaments occur in bundles enclosed in a common sheath, forms a bluish green turf or film on littoral soil, on wooden piers, on borders of tide-pools, etc.

Hydrocoleum comoides (Harv.) Gom. has been found on rocks near low-water mark at Cox's Bay, Devonshire. In this, as in the *Microcoleus,* there is a number of threads inside a common sheath, but the number is less.

Family **NOSTOCÀCEAE.**

Nostoc commune Vauch. is not uncommon both on moist ground and on ground that is apparently dry a good deal of the time. It forms a conspicuous olive-green or nearly black membranous crust that is gelatinous when moist and rather brittle when dry. It often, especially when dry, appears to lie loose on the ground, without attachments of any sort. The more or less confluent thalli sometimes appear to be several inches broad and show elevated lobes and bullae and very irregular pits and lacunae on the upper surface. Under a compound microscope, the cells, imbedded in a gelatinous matrix, look like chains of beads, with occasional yellowish usually larger cells known as heterocysts.

Family **SCYTONEMATÀCEAE.**

Scytonema ocellatum (Dillw.) Thuret, forms a dark almost black turf of minute intricate or suberect threads on the sand dunes of Paget. In the Scytonemataceae the sheaths of the filaments are firm and are scarcely gelatinous even when wet; the filaments often show a so-called "false" branching; and, as in most of the other genera of the family, there are heterocysts somewhat like those of *Nostoc*.

Scytonema myochrous Ag., which, like the former, can hardly be considered a marine species, forms a short nap or felt on rocks, as about Harrington Sound.

Scytonema junipericola Farlow, forms dark velvety patches on the bark of the Bermuda cedar.

Family **STIGONEMATÀCEAE.**

Hapalosiphon intricatus W. & G. S. West, a delicate fresh-water filamentous species, has been reported by Collins from the Devonshire marshes, where it occurs in ditches, with *Sphagnum*. In this genus the filaments show "true" lateral branching and intercalary heterocysts are present.

Family **RIVULARIÀCEAE.**

Rivularia polyotis (Ag.) Born. & Flah. forms small blackish green sinuose-bullate gelatinous cushions on rocks and other objects between the tide lines. In the Rivulariaceae there is a distinct differentiation of base and apex of the filament, the apex running out into a thin hair. In *Rivularia*, the filaments have a more or less radial arrangement and there is a heterocyst at the base of each filament.

Calothrix scopulorum (Web. & Mohr) Ag. has been found by Mr. Collins at Shelly Bay, where it formed a blackish green layer on a rock near the high-water mark.

Polythrix corymbosa (Harv.) Grun. forms a turf on rocks just below the low-water mark. The erect subdichotomously branched fastigiate blue-green

threads seem coarser than those of most Cyanophyceae, but the microscope shows that each thread is a cylindric bundle of closely compacted filaments of the *Rivularia* or *Calothrix* type. Mangrove Bay (*Hervey.*)

Sub-class **CHLOROPHYCEAE.**

The affinities of the marine algae of Bermuda with those of southern Florida and the West Indian region are nowhere more clearly shown than in the order Siphonales of the sub-class Chlorophyceae, more particularly in such genera as *Caulerpa, Avrainvillea, Udotea, Penicillus, Halimeda, Codium, Valonia, Batophora, Dasycladus, Neomeris, Acicularia,* and *Acetabulum,* all of the species of which seem identical with those from farther south. It is probable that systematic dredging operations in waters from 50 to 300 feet deep would materially increase the number of species of Siphonales that Bermuda shares with Florida and the West Indies. Some of the larger Green Algae that have been found are the following:

Family **ULVACEAE.**

Ulva Lactuca L., the Sea Lettuce, in various forms, is not uncommon, especially in sheltered places. The thallus consists of a thin flat green membrane, which is shown by the microscope to be two cells thick.

The genus **Monostroma,** in which the thallus is outwardly rather similar to that of the Sea Lettuce, but consists in the main part at least of only one layer of cells, is represented by one or more species.

The genus **Enteromorpha,** in most of the species of which the thallus is tubular with the walls one cell thick, is represented by several species growing in shallow water or on rocks or other objects between the tide lines. **Enteromorpha intestinalis tenuis** Collins, **E. flexuosa** (Wulf.) Ag., **E. flexuosa submarina** Collins & Hervey, **E. plumosa** Kütz., and **E. minima** Naeg. are the names employed by Collins for the species issued in the Phycotheca Boreali-Americana. **E. plumosa** Kütz., the branches of which commonly terminate in a single row of cells, has been found by Collins, attached to floating wood.

Family **VALONIACEAE.**

Valonia ventricosa J. Ag., Sea Bottles, one often finds washed ashore on South Beach. The plant is essentially an ovoid, pyriform, or subglobose membranous sac filled with protoplasm and attaining a diameter of one or two inches. When living it is dark green and more or less iridescent. On being killed and bleached it becomes beautifully pellucid and is as attractive then as when living.

Valonia macrophysa Kütz. In this species the vesicles are smaller than in the preceding and they often branch copiously, forming clumps as large as a man's fist or even head. It occurs in shaded sheltered places, as in mangrove swamps, and has an extraordinary development in the ponds near Walsingham, where it forms large beautifully iridescent masses attached to

submerged rocks and logs. (Phyc. Bor.-Am. *1867;* Alg. Exs. Am. Bor. *171,* as *V. utricularis* Ag.)

Ernodesmis verticillata (Kütz.) Børg. This plant was formerly considered to be a *Valonia,* to which genus it is closely related. The plant is repeatedly branched, the slender club-shaped branches or vesicles occurring in whorls of 4 to 12. The species has been found in Harrington Sound and in a shallow tidal stream flowing into Hungry Bay. (Phyc. Bor.-Am. *1907.*)

Dictyosphaeria favulosa (Ag.) Decaisne, has been found at Harris Bay by Hervey (Phyc. Bor.-Am. *2015*). It forms hollow membranous thalli that are at first subglobose or lightly wrinkled or lobed, becoming later irregularly torn or somewhat cup-shaped, the thallus often as large as one's fist. The surface of the thallus shows numerous hexagonal facets, mostly a half line or less in diameter, suggesting a miniature honeycomb. The plant grows attached to rocks in shallow water.

Siphonocladus tropicus (Crouan) J. Ag. has lateral flagelliform branches 0.5–2 inches long, clothed with irregular often crowded proliferations mostly $\frac{1}{15}$–$\frac{1}{4}$ inches long.

Siphonocladus rigidus M. A. Howe, has, for the most part, a dichotomous or subdichotomous mode of branching, though short, irregular or subsecund, mostly unicellular, lateral proliferations are of occasional occurrence. The cell walls are thick and under a microscope conspicuously lamellate, and the septa are often mammillate or tuberculate on their upper faces. It grows on rocks and pebbles in shallow water or at the low-tide line. Agar's Island (*Collins*). (Phyc. Bor.-Am. *2169.*)

Petrosiphon adhaerens M. A. Howe, forms closely appressed slightly calcified light green crusts or cushions in tide-pools or on limestone rocks near the low-water mark. It has a radially striate or sulcate appearance owing to its radio-marginal growth. The plant is actually attached to the rock by boring rhizoids and can not well be removed without use of hammer and chisel. The species was originally described from the Bahamas, but has recently been found in the Bermudas by Hervey. (Phyc. Bor.-Am. *2073.*)

Anadyomene stellata (Wulf.) Ag. is not uncommon on rocks, growing mostly in 1–20 feet of water. It forms a membranous bright green subsessile thallus usually 1–3 inches high or broad and looking a little like a young *Ulva* but crisper and more rigid to the touch. Under a hand-lens or even to the naked eye it shows an elegant system of venation, with the principal veins radiating in a palmate, flabellate, or semicircular fashion from radially successive foci. (Phyc. Bor.-Am. *1906.*)

Struvea ramosa Dickie, was originally described from the Bermudas from material dredged in deep water by the Challenger Expedition and has since been reported from the Canary Islands. The plant is two or three inches tall, more than half of which consists of the slender simple or oppositely branched stipe, which is rugose-annulate near the base or also at the base of its branches.

Terminating the stipe or each of its branches is a plane elliptic or ovate network of opposite or substellate cohering branches and branchlets. The plant is easily distinguished from *Anadyomene* by its long slender stalk and by the less solid or more lacunose network. In this *Struvea* the vacant spaces among the united branchlets occupy an area that is in the aggregate fully equal to that occupied by the branchlets themselves, while in *Anadyomene* the membrane is very nearly solid and continuous.

Boodlea struveoides M. A. Howe, sp. nov. Thallus weakly stipitate, the stipe simple or dichotomous, 5–30 mm. (1–4 cells) long, 200–450 μ in diameter, its cells 4–40 times as long as broad; branches variously disposed, often mostly opposite and developing in a single plane, their branchlets cohering frequently by tentacula and forming a flat uniaxial frond often 1 cm. long and wide (4–16 meshes wide), these fronds, in turn, cohering with others of their kind and forming dense spongy confervoid cushions 2–4 cm. in diameter; or, branches subpalmate, palmately subdistichous, subverticillate, or emerging irregularly and in all directions; cells of the main axes 150–320 μ in diameter, mostly 2–5 times as long as broad, becoming scarcely longer than broad above; branches and branchlets numerous, patent or divaricate, the ultimate cells 60–80 μ in diameter, 2–4 times as long as broad, often recurved.

On rocks in about 3 dm. of water, Harrington Sound (type, *Howe 131*, in herb. N. Y. Bot. Gard.).

This species is somewhat intermediate between *Boodlea siamensis* Reinb. and *Struvea anastomosans* (Harv.) Piccone, but can not be accurately identified with either. Its nearest relatives are doubtless the East Indian *B. siamensis* Reinb. and *B. paradoxa* Reinb., from both of which it apparently differs in the development of a weak stipe (sometimes as much as 3 cm. long) and in the commonly more *Struvea*-like development of its upper parts. It is also more rigid and somewhat coarser in all its parts than *B. siamensis*, a type duplicate of which has been compared with it. The frequent irregular development of the branches in all planes makes the plant a *Boodlea* rather than a *Struvea*. Of the Bermudian algae, this plant is perhaps most likely to be confused with small pulvinate Cladophoras or with *Cladophoropsis membranacea*, but examination with a hand-lens or attempts to disentangle the mats disclose the cohesions of the branchlets and the net-like meshes of the *Boodlea*. Apparently endemic.

Family **CLADOPHORÀCEAE.**

Cladophoropsis membranacea (Ag.) Børg. occurs on rocks near the low-water mark, on roots of mangroves, and in pools, forming bright green attached cushions or loose irregular detached clumps. In structure it resembles a *Cladophora*, but the branches are, usually at least, without a septum at the base. (Phyc. Bor.-Am. *1866.*)

Cladophora fuliginosa Kütz. Somewhat similar to *Cladophoropsis membranacea* and possibly a derivative of it, is the composite organism described and figured by Harvey as *Blodgettia confervoides*, which occurs in Bermuda in similar places, though often in more agitated water. This turns blackish on being killed and is often blackish when found growing. There is present

in the cell walls a peculiar filamentous fungus, to which E. P. Wright has restricted the generic name *Blodgettia*, with the new specific name *Borneti*. Whether this algicolous fungus is to be considered a lichenogenous one or simply a parasite is possibly a matter of definition of terms, though it seems to conform better to the usual conception of a parasite. The cell walls of the host are commonly more rigid and the branches more commonly have a septum at the base than is the case in *Cladophoropsis membranacea*. The combination of fungus and alga was apparently first described by Kützing under the name *Cladophora fuliginosa*, a name recently revived by Collins and by Børgesen. (Phyc. Bor.-Am. *2012*.)

Cladophora catenifera Kütz. was originally described from the Cape of Good Hope. The name has been applied by Collins to a Bermudian plant that is somewhat similar, but has shorter, more fasciculate-divaricate ramuli. It is one of the largest and coarsest of the Cladophoras. In a sheltered place in Red Bay, St. David's Island, it forms stiff erect dark green tufts that are sometimes nearly a foot and a half high.

Cladophora crystallina (Roth) Kütz. is the name under which Collins has distributed (Phyc. Bor.-Am. *1865*) Bermudian specimens from pools on the South Shore and at Harrington Sound. The plant has fine soft copiously branched filaments and has a glossy appearance on being pressed and dried.

Cladophora Howei Collins forms compact yellowish green mats or tufts about half an inch high on rocks in tide pools on Gibbet Island. Endemic.

Cladophora fracta (Vahl) Kütz. is a widely distributed and variable species of fresh or brackish water. It has been found by Hervey in a reservoir near Spanish Rock. (Phyc. Bor.-Am. *2013*.)

Cladophora corallicola Børg. is a name that has been adopted by the editors of the Phycotheca Boreali-Americana (*2010*) for a plant collected at Tucker's Town by Dr. Hervey. The name was first proposed for a Danish West Indian plant, dredged from a depth of about 100 feet, where it formed a dense covering on dead corals and shells.

Cladophora crispula Vickers, was originally described from Barbados, where it forms dense, closely interwoven, spongy, olive-green or dusky green masses, lobes of which sometimes grow out as irregular rope-like strands an inch or so long. Under a lens the ultimate branchlets are seen to be curved and inflexed, giving a densely crisped or curled appearance to the matted surface. The name has been applied in the Phycotheca Boreali-Americana (*2011*) to a lighter-colored, much less crisped and spongy plant from Harrington Sound.

Cladophora utriculosa Kütz. is a name under which a plant from Harrington Sound has been distributed in the Phycotheca Boreali-Americana (*2014*). The cells of this Bermudian plant, however, seem to be on the average much shorter than those of the original plant from the Adriatic Sea. It is very difficult, if not impossible, to define the limits of currently recognized species of *Cladophora* and the interpretation of the species and their range of vari-

tion is a subject of widely varying treatment by phycological writers. *Cladophora,* in fact, seems to be a genus in which clearly defined species do not exist. Other species, as currently recognized, certainly occur in Bermuda.

Chaetomorpha Linum (O. F. Müll.) Kütz. occurs in quiet water, as in Harrington Sound, the ponds of Walsingham, Hamilton Harbor, and at Hungry Bay. It forms unattached tangled mats of delicate unbranched threads (diam. $\frac{1}{10}$–$\frac{1}{6}$ of a line) made up of a single row of cells. (Phyc. Bor.-Am. *1863*, as *C. aerea,* forma *Linum.*)

Chaetomorpha crassa (Ag.) Kütz. is a species with coarser filaments ($\frac{1}{5}$–$\frac{2}{7}$ of a line in diameter) that is found in tide pools, fish ponds, mangrove swamps, etc. (Phyc. Bor.-Am. *1864.*)

Chaetomorpha brachygona Harv., collected at Walsingham by Collins, has filaments of $\frac{1}{4}$–$\frac{1}{2}$ the diameter of those of *C. Linum* and *C. crassa,* with cells scarcely longer than broad.

Chaetomorpha minima Collins & Hervey, is a name under which the editors of the Phycotheca Boreali-Americana (*2007*) have distributed a slender plant found by Hervey, attached to *Cladophora, Codium,* etc. in Harrington Sound. Endemic.

Rhizoclonium hieroglyphicum (Ag.) Kütz., a widely distributed species, has been reported (Phyc. Bor.-Am. *2009*) as occurring in Bermuda in reservoirs and in fresh-water rock-pools.

Rhizoclonium crassipellitum W. & G. S. West, originally described from Portuguese West Africa, has been reported from a fresh-water pool near Ely's Harbor (Phyc. Bor.-Am. *2008*).

Rhizoclonium Hookeri Kütz., or something close to it, occurs associated with a moss, *Eucladium verticillatum,* on the walls of Smuggler's Cave, near Castle Harbor. The filaments are apparently more robust than those of plants from Kerguelen's Island to which the name was first applied.

Rhizoclonium tortuosum Kütz., which is perhaps an untenable name, may be used for the present for a plant that is found in tangled mats on rocks at the high-tide line on the Paget shore of Hamilton Harbor.

Rhizoclonium Kerneri Stockmayer, is a name that has been applied by Collins to a plant that forms a dark green film on branches and roots of the mangroves, accompanying *Caloglossa Leprieurii.* Its filaments are somewhat coarser than those of the type of this species.

Family **DASYCLADÀCEAE.**

Dasycladus vermicularis (Scop.) Krasser, a dirty-yellowish-green cylindric or club-shaped plant, mostly 1–3 inches high and $\frac{1}{8}$–$\frac{1}{4}$ inch broad, with densely compacted whorls of branches, which are in turn two or three times verticillately ramulose, has been found on pebbles in a shallow bay on Cooper's Island by Collins. In this genus the gametangia are terminal on the primary branches. (Phyc. Bor.-Am. *1868,* as *Dasycladus clavaeformis.*)

Batophora Oerstedi occidentalis (Harv.) M. A. Howe, is usually a smaller plant than the foregoing, with more widely spaced whorls of primary branches. The sporangia, containing large firm-walled aplanospores are lateral at the distal ends of the primary or secondary branches. It occurs on old shells, old shoes, pebbles, etc. at Spanish Point, etc. (Phyc. Bor.-Am. *1910* and *2016*.)

Neomeris annulata Dickie, is a light green or whitish lime-encrusted, worm-like plant scarcely one inch high, with a cortex that shows under a hand lens numerous small hexagonal facets in regular transverse rows. It grows on stones in shallow water on White's Island in Hamilton Harbor and in Harrington Sound, maturing in the month of July. The strongly calcified sporangia cohere laterally and form transverse rings in the lower half of the plant. (Phyc. Bor.-Am. *1909*.)

Acetabulum crenulatum (Lamour.) Kuntze, the dainty Mermaid's Wine Glass, is not uncommon on pebbles, shells, pieces of dead coral, etc. in shallow water, growing especially in rather protected places. Particularly attractive specimens are found, in the summer at least, in the tidal stream that forms the outlet of one of the ponds in the Walsingham region. The plants are 1–4 inches high and are terminated by a disc or cup $\frac{1}{2}$–$\frac{5}{8}$ inch broad. Practically the whole plant is usually strongly coated with lime and it becomes a chalky white soon after being taken from the water and exposed to the light, though in the living state the cup part, at least, is commonly a light green. Each of the 35–60 radial chambers of which the cup is composed is in large part a sporangium, containing in the present species 200–500 subglobose firm-walled aplanospores, which are not calcified. (Phyc. Bor.-Am. *1908*, as *Acetabularia crenulata*.)

Acicularia Schenckii (Möb.) Solms, looks a little like the preceding but is smaller in every way and is less common. The disc or cup is very nearly flat, is only about $\frac{1}{4}$ in. broad, and has only 30–42 radial chambers, and the aplanospores are embedded in a coherent mass of lime. It was found late in the month of June, growing on stones in a tidal creek flowing from a mangrove thicket at Hungry Bay. The species was originally described from Brazil and is of occasional occurrence in the West Indies.

Family **BRYOPSIDÀCEAE.**

Bryopsis hypnoides Lamour., a species with repeatedly compound irregular ramification, almost suggesting an *Ectocarpus* or certain Cladophoras in the tenuity of its branches and general habit, occurs in shallow water in Hamilton Harbor, Harrington Sound, etc. (Phyc. Bor.-Am. *1870*.)

Bryopsis Harveyana J. Ag., a much coarser plant than the preceding, with the main branches interruptedly pectinate-plumose towards the apices and the ultimate ramuli subsecund and often glomerate-fascicled, occurs in shallow water at Tobacco Bay (Howe 1651).

Bryopsis pennata Lamour., a plant with long naked stalks and simply pinnate terminal plumes (a plant more slender and delicate than the type of the species), has been found growing on a rock at the low-water line at Castle Harbor by Mr. Collins. (Phyc. Bor.-Am. *1871*, *2166* and *2167*.)

Family **CAULERPÀCEAE.**

Caulerpa prolifera (Forsk.) Lamour. has a particularly luxuriant development in 3–10 feet of water in the ponds of the Walsingham region, where its stolons, 2–3 feet long, send up stalked occasionally proliferous dark green laminae that are 5–8 inches high and ¾–1 inch broad. (Phyc. Bor.-Am. *1872*.)

Caulerpa sertularioides (S. G. Gmel.) M. A. Howe, though not uncommon elsewhere, is particularly well developed in the locality just mentioned. Its erect branches are regularly pinnate, with the numerous sharp-pointed subterete ultimate ramuli scarcely coarser than bristles. (Phyc. Bor.-Am. *1873*.)

Caulerpa crassifolia (Ag.) J. Ag. also has pinnate branches, but its pinnules are broader ($\frac{1}{20}$–$\frac{1}{10}$ in. wide), and less numerous, distinctly flattened, linear-oblong or subfalcate, slightly overlapping or free and spaced. The species grows on rocks, stones, roots of mangroves, etc. in rather sheltered places, as in Port Royal Bay, Hungry Bay, the ponds of Walsingham, Harrington Sound, Castle Harbor, etc. (Phyc. Bor.-Am. *1919*.)

Caulerpa cupressoides (West) Ag. has, in the Bermuda forms, the short small sharp-pointed ramuli in several ranks. It is an extremely variable species, originally described from the Danish West Indies. The prevailing Bermuda form is the forma *ericifolia* (Turn.) Web. v. Bosse, which was described and figured from Bermuda by Turner in 1808. (Phyc. Bor.-Am. *1920*.)

Caulerpa racemosa occidentalis (J. Ag.) Børg. is common in 1–20 feet of water on rocks and piers in Hamilton Harbor. Its pyriform-clavate ultimate ramuli, which are commonly rather abruptly swollen at the rounded-obtuse apices, are in several or many irregular ranks. The largest specimens seen came from Castle Harbor. In these the main branches are nearly two feet long. Other varieties, also, of this species have been reported from Bermuda. (Phyc. Bor.-Am. *2020*, *2021* and *2022*.)

Caulerpa verticillata J. Ag. has been found by Hervey at St. George's and what we take to be a form of it also at Harris Bay.* The latter, which grew in a tide pool, appears to be a reduced or poorly developed condition of forma *charoides* (Harv.) Web. v. Bosse. It has a creeping rhizome an inch or more long, from which arise erect dark green composite branches a line or two high. Under a lens these erect branches are seen to bear numerous short hair-like branchlets which are rather irregularly arranged and several times

* *C. pusilla* Collins, Holden & Setchell, Phyc. Bor.-Am. *2019*—perhaps not *C. pusilla* Martens & Hering, which seems to be certainly known only from Pernambuco. If it should be found impossible to maintain *C. pusilla* and *C. verticillata* as distinct species, the rules of nomenclature would seem to require the conservation of the name *pusilla*, as it probably had a slight priority, perhaps of only a few weeks or days, in actual printed publication.

dichotomous. In its typical condition, *C. verticillata* is a plant of lagoons and of the mangrove association, being often found attached to the roots of *Rhizophora* near the low-water mark. Its erect branches may then attain a height of 1–6 inches and the dichotomous ramuli occur in a more or less clearly defined succession of whorls or tufts.

Family **CODIACEAE.**

Avrainvillea nigricans Decaisne, occurs on rocks just below the low-water mark, as at Gibbet Island and Harris Bay. It is spongy and blackish and the flabelliform, cuneiform, or oblong upright part is in the Bermuda specimens mostly only 2 or 3 inches high. Under the compound microscope the filaments of the flabellum are found to be moniliform. (Phyc. Bor.-Am. *2171.*)

Avrainvillea longicaulis (Kütz.) Murr. & Boodle, occurs in the ponds of Walsingham, where it gets to be more than a foot tall. It here has a long stalk, finally terminated by an irregular flabellum that is sometimes several inches long or broad. In external form, however, this species and *A. nigricans* often resemble each other closely and the best distinguishing characters are found in the form of the filaments of the flabellum, which in *A. longicaulis* are commonly cylindric with a strong constriction at the base of each branch. From the Udoteas, the Avrainvilleas are distinguished by their lack of calcification, by their softer more spongy texture, and by their blackish or dusky brown color. (Phyc. Bor.-Am. *2170.*)

Udotea Flabellum (Ell. & Soland.) M. A. Howe, is a more or less fan-shaped calcified light yellowish green or dark olive-green plant, mostly 2–10 inches high, and showing concentric zonations. The flabellum has a compact firm cortex. Forms occur in which the flabellum is variously lobed and laciniate. The species is rather common in 1–50 feet of water, growing mostly on a sandy or muddy bottom. (Phyc. Bor.-Am. *1914.*)

Udotea conglutinata (Ell. & Soland.) Lamour. is usually a smaller lighter green plant, the flabellum of which is destitute of a highly specialized cortex. Under a hand lens the surface of the flabellum appears spongiose or longitudinally strigose. With a higher magnification each of the flabellum filaments is seen to be enclosed in a porose calcareous sheath. This species has been found on South Beach in Paget by Farlow and at Harris Bay by Hervey. (Phyc. Bor.-Am. *1913.*)

Penicillus capitatus Lamarck, the Merman's Shaving Brush, is common, usually on a sandy or muddy bottom in shallow water. It has a subterete and strongly calcified stalk and a commonly subglobose head, the free dichotomous filaments of which are each enclosed in a porose calcareous sheath. The plants are usually from 1 to 9 inches in height. (Phyc. Bor. Am. *1911* and *1916.*)

Penicillus pyriformis A. & E. S. Gepp, has a more pyriform-obovoid or obconic head and usually a shorter stalk and the filaments of the head are more intertangled. The best distinguishing characteristics are, however, found in

cortex of the stalk, which, under a hand lens, appears spongiose or velutinous-tomentulose, while that of *P. capitatus* is compact, indurated, and smooth. Under higher magnification, the ultimate branchlets of the corticating filaments are seen to be elongate and taper-pointed, while in *P. capitatus,* they are short-oblong, obtuse, truncate, or capitate. *P. pyriformis* has its best development in the Bahamas, but it has been found in Ely's Harbor and Harris Bay and doubtless occurs elsewhere in the Bermudas. (Phyc. Bor.-Am. *2075.*)

Halimeda Tuna (Ell. & Soland.) Lamour. occurs on rocks in shallow water, as at Spanish Point, Gibbet Island, inlet of Harrington Sound, Achilles Bay, etc. In this, as in all the Halimedas, the thallus is calcified and jointed. In *H. Tuna,* the segments are discoid, mostly reniform or semi-orbicular. The filaments of the central strand fuse in twos or threes at the nodes but are otherwise commonly free. (Phyc. Bor.-Am. *1918.*)

Halimeda tridens (Ell. & Soland.) Lamour. grows usually on a sandy or muddy bottom and in 1–100 feet of water. It is more shrubby in its habit than *H. Tuna* and the segments are typically flattened and 3-lobed or 3-dentate, though variable as to this character, as also in the shape of the segments, which range from subquadrate-orbicular, with the long axis transverse, to obovate, deltoid-obovate, cuneiform, or occasionally subcylindric. When decalcified the cells of the cortex are found to measure 49–77 μ in average maximum diameter in surface view.

Halimeda Monile (Ell. & Soland.) Lamour. differs from *H. tridens* chiefly in having its segments mostly subcylindric and in having its surface cells only 30–44 μ in average maximum diameter. (Phyc. Bor.-Am. *1915;* also *1917*—as *H. tridens*—in the one copy examined.)

Halimeda simulans M. A. Howe, imitates *H. Tuna* in its discoid usually subentire or crenate segments, but it is really more akin to *H. tridens* and *H. Monile,* as is shown by the fact that the filaments of the central strand, as in these two, form a single coherent inter-communicating mass at each node. The surface cells are small, as in *H. Monile. H. simulans* has recently been found near Tucker's Town by Hervey. (Phyc. Bor.-Am. *1916.*)

Halimeda Opuntia (L.) Lamour. This species was reported from Bermuda by Rein, but we have seen no Bermudian specimens. It is, however, very common in the Bahamas, southern Florida, and the West Indies, and its existence in the Bermudas is not improbable. It often occurs in rather deep water (10–100 ft.) and may be brought to light in Bermuda by dredging operations. It differs from the other species in forming large tangled mats or cushions. It is strongly calcified, and the discoid segments are clearly or obscurely nerved. The branches and their segments are very often turned or twisted at various angles, and in its more luxuriant development its branches form long tangled chains. Certain naturalists claim to have experienced a prickling sensation as of a slight electric shock when handling plants of this species, either with bare hands or with metal implements.

The late Sir John Murray in reporting the results of the Challenger Expedition intimates that calcareous seaweeds and their broken down fragments were the dominating elements in three out of four analyzed samples of so-called "coral" sand or mud from Bermuda and Dr. Henry B. Bigelow in a paper on "The Shoal-water Deposits of the Bermuda Banks" has named *Halimeda* as a genus that has contributed an important part to the formation of such sand or mud. If this determination is correct, it might be taken as an indication of the existence of *Halimeda Opuntia* in Bermudian waters, for the other species of the genus, both here and in the West Indies, would hardly seem to occur in sufficient masses to be an important factor in the making of sand and mud.

Codium intertextum Collins & Hervey, forms spongy dark green, closely adherent or repent, irregularly lobed or branched, mats or cushions under shelving rocks or in rock crevices near the low-water mark, as at Gibbet Island and Bailey's Bay. (Phyc. Bor.-Am. *2018.*) Also West Indian.

Codium tomentosum (Huds.) Stackh. is not uncommon on rocks near the low-tide line, forming spongy masses that are mostly from four inches to two feet long. Its branches are cylindric or slightly flattened and repeatedly dichotomous.

Codium isthmocladum Vickers, is much like *C. tomentosum*, but is more flaccid and more nitent when dry and its branches are often constricted at their bases. Under a microscope, the utricles forming the superficial layer are seen to be about twice as broad as those of *C. tomentosum.* (Phyc. Bor.-Am. *1869*, as *Codium tomentosum.*)

Codium decorticatum (Woodw.) M. A. Howe (*C. elongatum* Ag.) is perhaps not always distinct from *C. tomentosum* but is usually recognizable by being more elongate, more sparingly branched, by flattened expansions under the dichotomies, and by the much larger utricles. Some remarkable specimens collected in Tobacco Bay, St. George's, late in June were 2–4 feet long, with flattened expansions ½ to 8 inches broad. (Phyc. Bor.-Am. *2017.*)

Family **VAUCHERIÀCEAE.**

Dichotomosiphon pusillus Collins, forms a dark green felt of slender intertangled filaments on sand-covered rocks or in rock crevices near low-water mark, as at Shelly Bay (Phyc. Bor.-Am. *2023*) and on roots of mangroves, in company with *Bostrychia Montagnei.* Under a compound microscope its usually dichotomous or trichotomous filaments are seen to be constricted here and there and there is nearly always a strong constriction at the base of each branch. A complete constriction or an imperforate septum is, however, of a very rare occurrence. The mode of reproduction has not been observed and there is accordingly some doubt as to the generic and family affinities of the plant. In its vegetative characters it shows resemblances to the Codiaceae. The type locality is on the island of Jamaica.

Family **CHARÀCEAE.**

Chara foliolosa Muhl., a common stonewort of the West Indian region, has been reported from the Pembroke Marsh (*Farlow*) by H. & J. Groves (in Urban, Symb. Antill. 7: 43. 1911), under the name *Chara zeylanica* Willd. forma *curassavica* Braun. What is doubtless the same thing, with same locality and collector, is listed by Collins and Hervey as *Chara gymnopus* var. *Berteroi* A. Braun.

Sub-class **PHAEOPHÝCEAE.**

Family **ECTOCARPÀCEAE.**

Ectocarpus Mitchellae Harv., a species originally described from Nantucket, but since found to be widely distributed, has been reported from Bermuda (Phyc. Bor.-Am. *1921*), but the specimen distributed does not seem to the writer to belong to this species. The plurilocular sporangia in *E. Mitchellae* are sessile, ellipsoid-oblong, and very obtuse. In the genus *Ectocarpus* the thallus consists of delicate copiously branched filaments made up of a single row of cells.

Ectocarpus siliculosus arctus (Kütz.) Kuck., collected at Harris Bay by Hervey (Phyc. Bor.-Am. *1922*) has more pointed, ovoid, not always sessile, plurilocular sporangia.

Ectocarpus confervoides (Roth) Le Jolis, with spindle-shaped, sessile or short-stalked plurilocular sporangia, has been found in Bermuda by Hervey. Other species of *Ectocarpus* certainly occur in Bermuda, but their determination awaits more critical study.

Ascocyclus orbicularis (J. Ag.) Magnus, has been reported by Collins from Cooper's Island (Phyc. Bor.-Am. *1878*), where it forms minute olive-green spots on the leaves of the Turtle Grass (*Thalassia*).

All of the four Ectocarpaceae mentioned above are species of wide distribution and are best known from more northerly waters.

Family **SPHACELARIÀCEAE.**

Sphacelaria tribuloides Menegh. forms brownish tufts of fine sparingly branched filaments about ½–1 inch high in tide pools and in rock pockets and crevices between the tide lines, especially on the South Shore. The younger terminal branches consist of a single row of cells, but the older parts of the filaments are made up of bundles of parallel cells. The apical cells in this genus are commonly somewhat enlarged, are especially rich in protoplasm, and, often somewhat blackened, are usually conspicuous under a hand-lens in the preserved specimen. In the present species, the filaments commonly bear small multicellular stalked gemmae which in form suggest the fruits of certain species of *Tribulus* and *Trapa*.

Family **ENCOELIÀCEAE.**

Colpomenia sinuosa (Roth) Derb. & Sol., a widely distributed plant of warm temperate and tropical waters, forms brownish hollow often irregularly

lobed or wrinkled cushions, sometimes as large as a man's fist, on rocks just below the low-water marks, as on White's Island, in Hamilton Harbor, etc. (Phyc. Bor.-Am. *2024*.)

Hydroclathrus cancellatus Bory, is somewhat similar to the above in color, habit and distribution, but it has a perforate or net-like thallus. Spanish Rock. (Phyc. Bor.-Am. *2078*.)

Scytosiphon Lomentaria (Lyngb.) J. Ag. is one of the few algae of the North Atlantic that occur also in Bermuda. It has a hollow, unbranched, cylindric or slightly flattened, brownish or olive-green thallus, often constricted at intervals, and commonly 2–10 inches long, and $\frac{1}{12}$–$\frac{1}{4}$ inch in diameter. (Shelly Bay, *Hervey*—Phyc. Bor.-Am. *2079*.)

Rosenvingea intricata (J. Ag.) Borg. has a tubular very irregularly branched thallus. Single plants form flattened tangled olive-green mats mostly 1 to 5 inches broad. The main branches attain a diameter of 1 or 2 lines, this diameter being much reduced at the dichotomo-palmate extremities. (Harris Bay, *Hervey*—Phyc. Bor.-Am. *2173*.)

Family **MESOGLOIÀCEAE.**

Castagnea Zosterae (Mohr?) Thuret (?) is a name that may be applied with considerable doubt to a brownish gelatinous irregularly branched plant that grows attached to leaves of the Turtle Grass (*Thalassia testudinum*) in Castle Harbor and doubtless elsewhere in the Bermudas. It grows to be from four to eight inches long, with its larger branches about $\frac{1}{75}$ in. in diameter and the smaller about $\frac{1}{50}$ in. It is a larger, more copiously branched plant than those from more northern waters to which the above name is currently applied. There is doubt not only as to its specific identity, but even more as to the legality of the nomenclature here provisionally adopted. It is probable that a thorough-going revision of the Mesogloiaceae, accompanied by a critical study of the type specimens on which various genera and species have been based, may show that the legal generic name for this plant is *Aegira*, proposed in 1825 by Elias Fries for the *Linckia Zosterae* of Lyngbye. The various genera proposed later for members of this group seem to be distinguished from each other by characters of uncertain value and constancy and it is probable that one or more of the names *Myriocladia* J. Ag., *Cladosiphon* Kütz., *Castagnea* Derb. & Sol., and *Endesme* J. Ag. may be found to be generic synonyms of *Aegira*. The Bermuda plant has been distributed in the Phycotheca Boreali-Americana (*1879*) as *Castagnea mediterranea* (Kütz.) Bornet, but it is a more slender, more freely branched, and more gelatinous plant than the original *Cladosiphon mediterraneus* Kütz. and has longer peripheral filaments. Moreover, *C. mediterraneus* is the monotype of *Cladosiphon* and the current rules of nomenclature would forbid its transfer to the later-published *Castagnea*.

Family **SPOROCHNÀCEAE.**

Sporochnus Bolleanus Mont. is found washed ashore on the South Beach. It is a brownish freely branched plant a foot or more in height. The main

branches and the lateral branchlets each end in a subglobose or pyriform enlargement bearing a dense tuft of delicate filaments. The lateral tuft-bearing enlargements are sessile in the younger parts, but a stalk for each develops and lengthens with age until the plant is terminated and fringed by a great number of small brush-like structures. The enlargements also elongate with age and together with the stalks form club-shaped ramuli ¼ inch or more long in the older parts, finally becoming naked by the disappearance of the crown of filaments. When the living plant is suspended in the water and properly lighted the terminal tufts appear luminous and iridescent, the whole suggesting some sort of miniature candelabrum of small torches. *S. Bolleanus* was originally described from the Canary Islands, but has since been reported from Porto Rico. (Phyc. Bor.-Am. *2174.*)

Family **TILOPTERIDÀCEAE.**

Heterospora Vidovichii (Menegh.) Kuck. has been reported as occurring on the walls of the inlet near the Hotel Frascati [Phyc. Bor.-Am. *2026*, as *Haplospora Vidovichii* (Menegh.) Bornet]. It forms long tufts of delicate brownish green threads. *Heterospora* resembles *Ectocarpus* in general habit, but differs in mode of reproduction. *H. Vidovichii* was first described from the Adriatic Sea.

Family **FUCÀCEAE.**

Ascophyllum nodosum (L.) LeJolis, one of the commonest rockweeds of north-temperate coasts, has been found floating in Bermudian waters, by Collins.

Turbinaria tricostata E. S. Barton, which is perhaps not always distinct from *Turbinaria turbinata* (L.) Kuntze (*T. trialata* Kütz.), grows on surge-swept rocks near the low-water mark or in low tide-pools on the South Shore, as at Hungry Bay. Its ultimate branches are peltate or subturbinate, about half an inch long, consisting of a suborbicular dentate-margined terminal expansion supported by a 3-winged or 3-angled stalk. (Phyc. Bor.-Am. *1877.*)

Sargassum natans (L.) Meyen [*S. bacciferum* (Turn.) Ag.], the Gulf Weed, is common, washed ashore, especially on South Beach. The species of *Sargassum* have a thallus that is differentiated into parts resembling the stem and leaves of the higher plants and most of them have a branching basal holdfast suggesting roots, but the present species is known only in a free-floating or pelagic condition and is destitute of a holdfast. It is, however, doubtless derived as a species, if not as individuals, from attached forms that are known under another specific name or possibly under two or more specific names. Its alliances seem to be with attached plants known as *Sargassum Filipendula, S. foliosissimum,* or *S. vulgare.* In the genus *Sargassum* there are, in the mature state, stalked air-vesicles of about the size of a pea or often smaller. The leaf-like parts are more or less distinctly unicostate and in most species show to the naked eye or under a hand lens small dark spots or pits (cryptostomata) from which minute hairs arise. In *S. natans* such spots are wanting or few and obscure. (Phyc. Bor.-Am. *2180.*)

Sargassum fluitans Børg. is also found in a free-floating condition and is another inhabitant of the "Sargasso Sea." It is a coarser plant than *S. natans,* with broader leaves, these with shorter and proportionally broader teeth and often with more obvious cryptostomata; its air-vesicles are shorter-stalked, more numerous, often more nearly spherical, and they lack the apical appendage which is often a conspicuous feature of *S. natans;* its stem is roughened by short spinules or outgrowths, which are commonly lacking in *S. natans.* (Phyc. Bor.-Am. *2177.*)

Sargassum Filipendula Ag. In the ponds of Walsingham and doubtless elsewhere. The leaves show conspicuous cryptostomata and the stems are smooth or nearly so. (Phyc. Bor.-Am. *2176.*)

Sargassum lendigerum (L.) Ag. is a name that has been applied by J. Agardh and others to a Bermuda plant that is not uncommon on rocks a little below low-water line. The lowest or first leaves are often forked and rarely subpinnate, but most of them are simple, oblong or linear-oblong and dentate, the cryptostomata are conspicuous, and the lower parts of the stem are often much roughened by short irregular outgrowths; vesicles are often wanting. The Linnaean type of the species was from Ascension Island, lying in the Atlantic south of the Equator, and the current identification of the Bermuda specimens is open to question. (Phyc. Bor.-Am. *2178.*)

Sargassum linifolium (Turn.) Ag., a name originally given to a Mediterranean and Adriatic plant, has been used for a somewhat similar Bermudian form. It is related to the foregoing species, but apparently differs in the linear commonly subentire leaves, the upper of which as well as the lower are sometimes forked. (Phyc. Bor.-Am. *2179.*)

Family **DICTYOTÀCEAE.**

Spatoglossum Schroederi (Mert.) Kütz. occurs in the ponds of Walsingham, in Hamilton Harbor, etc. The thallus in well-developed conditions reaches a height or length of 5–8 inches; it is irregularly dichotomous, and its main segments, which show no costa, are ¼–¾ of an inch wide. Its margins are irregularly toothed and often proliferous. The color of the younger parts is an olive-green; of the older, a fuscous or fuliginous brown. Small irregularly scattered dark spots indicate the position of hair-clusters or of reproductive organs. (Phyc. Bor.-Am. *2027.*)

Zonaria zonalis (Lamour.) M. A. Howe. (*Fucus zonalis* Lamour. Diss. 38. *pl. 25. f. 1.* 1805; *Dictyota zonata* Lamour. Nouv. Bull. Sci. Soc. Philom. 1: 331. My 1809; Jour. de Bot. 2: 40. 1809; *Zonaria lobata* Ag. Syst. Alg. 265. 1824; *Stypopodium lobatum* Kütz. Tab. Phyc. 9: 25. *pl. 63. f. 1.* 1859.) This is common on rocks in shallow water in rather exposed places along the South Shore, where it is often found washed up on the beach. It grows in large masses and is more or less bluish iridescent when living and submerged. The plants attain a height or length of about one foot; the thallus is repeatedly cleft or lobed in a somewhat dichotomo-palmate fashion, the ultimate lobes being cuneate, cuneate-oblong, or cuneate-flabelliform, and ¼–¾ inch in greatest

width; the lobes are marked by conspicuous dark slightly curved transverse lines, these forming the boundaries of zones, which are mostly ⅛–¼ inch broad; the color of the younger parts is a brownish olive-green, occasionally verging towards red; the older parts are dark brown, becoming nearly black on drying. More ragged and dissected forms also occur, with lobes or laciniae scarcely more than ⅛ inch broad. This typically West Indian species was first described from Santo Domingo, but what seems to be the same thing occurs also in the Canaries. (Phyc. Bor.-Am. *1876*, as *Zonaria lobata.*)

Zonaria variegata (Lamour.) Ag. occurs on rocks, Udoteas, Halimedas, and other objects that may be reached by wading at low tide, as at Gibbet Island, Harrington Sound, Castle Harbor, Hungry Bay, and St. David's Island, and is also found washed ashore from deeper water, as on South Beach. It is a much smaller, less stalked, less lobed, and less distinctly zonate plant than *Z. zonalis.* The thallus is semiorbicular or flabelliform, mostly 1–3 inches broad, nearly entire or showing a few flabelliform segments; the margins are subentire or crenate-lobed; the color is olive, brownish olive, fuscous brown, or now and then reddish. It sometimes suggests a *Padina* but the apical margins are not inrolled as in that genus. This typically West Indian species has been reported also from the Canaries and elsewhere. *Zonaria collaris* Ag. is probably a synonym. (Phyc. Bor.-Am. *2028.*)

Padina is a genus of the Dictyotaceae that is represented in Bermuda by three species growing on rocks near the low-tide mark, or in shallow water. The three species have been more or less confused with each other and all have been identified with the *Padina pavonia* of southern Europe, with which only one of the three, and that the rarest, appears to be identical. The three often resemble each other very much in outward habit. In all, the thallus is distinctly zoned, and, as in nearly all Padinas, the apical margins are narrowly inrolled.

Padina Sanctae-Crucis Børg., which is probably the commonest, has, in Bermuda, a semi-orbicular, fan-shaped, or occasionally reniform thallus, mostly 1½–3 inches broad, subentire or sparingly divided or lobed, and is conspicuously encrusted with lime on the ventral surface; when living, it is commonly concave in such a fashion as to be a little suggestive of the human ear or of certain bivalve shells; sections, examined microscopically, show that the thallus is only two cells thick except at the extreme base, where it is three cells thick. The tetrasporic sori occur just above every second piliferous line and are provided with an evanescent indusium. (Phyc. Bor.-Am. *2082.*)

Padina pavonia (L.) Gaill. has been found on Gibbet Island by Hervey (Phyc. Bor.-Am. *2081*). It resembles the preceding but has a more cuneiform thallus or thallus-lobes, the thallus is mostly 3 cells thick, the tetrasporic sori commonly border each side of every second piliferous line, and the indusium is conspicuous and rather persistent.

A third species [*Padina variegata* Hauck, *Zonaria variegata* Kütz., not *Zonaria variegata* (Lamour.) Ag.], for which Dr. W. D. Hoyt is soon to publish a valid name, has ultimately a larger thallus than the two preceding,

reaching a height of five or six inches, is rather more lobed, the fan-shaped lobes mostly 1½–3 inches broad, and is less whitened by lime on its ventral surface. Sections show that the thallus is 3–6 cells thick except for a narrow zone at the apical margin, where it is but 2 cells thick. The tetrasporic sori are mostly in the form of compact dot-like clusters scattered irregularly in each interpilar zone or forming a narrow irregular line a little above the middle of the zone; indusium subpersistent. (Phyc. Bor.-Am. *2083*, as *Padina variegata*.)

Neurocarpus delicatulus (Lamour.) Kuntze [*Dictyopteris delicatula* Lamour.; *Haliseris delicatula* (Lamour.) Ag.] occurs on rocks in shallow water in well-shaded and sheltered places, as at Red Bay, St. David's Island. The species of this genus are distinguished from other members of the family by possessing a thallus with a distinct midrib. In the present species the thallus is of thin delicate texture and is several times regularly and somewhat divaricately forked. It reaches a length of 2 or 3 inches and the thallus segments are ½ to 2 lines broad. Dried specimens are a brownish or yellowish olive-green, but when living and immersed it often shows brilliant iridescent blue-green hues. The species was first described from Santo Domingo and is typically West Indian in its distribution. (Phyc. Bor.-Am. *1924*, as *Dictyopteris delicatula*.)

Neurocarpus Justii (Lamour.) Kuntze [*Dictyopteris Justii* Lamour.; *Haliseris Justii* (Lamour.) Ag.] is a much larger plant that grows on rocks in more exposed places, mostly in 1–20 feet of water. The thallus is costate and several times dichotomous, as in the last, but it reaches a length of 8–12 inches and its segments are ½–1½ inches broad. Its color is a dark olive or a fuscous brown. It is often found washed up on the South Shore. Like the last, it was first made known from Santo Domingo and is a typically West Indian species. (Phyc. Bor.-Am. *1925*, as *Dictyopteris Justii*.)

Dictyota Bartayresii Lamour. (*Dictyota crispata* Lamour.; *Dictyota pardalis* Kütz.) occurs in shallow water, as at Spanish Point, in the ponds of Walsingham, and at St. David's Island. It forms loosely intertangled mats 3–6 inches high. The thallus is repeatedly dichotomous and its segments are mostly 1–3 lines broad, with margins entire or irregularly proliferous. The species of *Dictyota* are difficult to define. The form of the thallus, width of the segments, etc. evidently vary greatly according to conditions of growth, and it is probable that more species are currently recognized than may be reasonably assumed to exist in nature. (Phyc. Bor.-Am. *1874*.)

Dictyota dichotoma (Huds.) Lamour. is less common in Bermuda than the preceding species. It is more regularly and less divaricately dichotomous and has a broader thallus, with segments mostly 2–4 lines wide. (Phyc. Bor.-Am. *2175*.)

Dictyota ciliolata Kütz. (*Dictyota ciliata* J. Ag.—not *D. ciliata* Lamour.; *Dictyota crenulata* Collins in Phyc. Bor.-Am. *1875*—not *D. crenulata* J. Ag.) occurs in Harrington Sound, in pools on the South Shore, etc. The thallus has few or many small simple teeth or short cilia on its margins; its segments

are mostly 1–2 lines wide; and its texture is rather more rigid than in *D. Bartayresii.*

Dictyota linearis (Ag.) Grev. is a name that seems applicable to a very narrow repeatedly dichotomous plant with segments only about one quarter of a line wide that occurs attached to stones, Halimedas, etc. in shallow water, as at Spanish Point.

Dictyota dentata Lamour. [*Dictyota Brongniartii* J. Ag.; *D. Mertensii* (Mart.) Kütz.; *D. subdentata* Kütz.] is, like *D. Bartayresii,* typically a species of the West Indies and northeastern South America. It has been found by Mr. Collins floating in Hungry Bay (Phyc. Bor.-Am. *1926*). In this species, the thallus is less dichotomous and more pinnatifid than in the other Bermudian species of the genus. The apices of the lobes vary from sharply acuminate to obtuse.

Dilophus guineensis (Kütz.) J. Ag. grows near low-water mark on rocks that are well exposed to surf action, as at Hungry Bay. The thallus is rather regularly dichotomous and is commonly 1½–3 inches high with segments ½ to 1 line broad. In a cross section, examined microscopically, the medulla is seen to consist of two layers of cells (or more in the basal parts), while in the genus *Dictyota* the medulla, normally at least, consists of a single layer of large cells. (Phyc. Bor.-Am. *2080.*)

Sub-class **RHODOPHÝCEAE.**

Family **BANGIÀCEAE.**

Bangia fuscopurpurea (Dillw.) Lyngb., which forms a soft fleece of fine dark purple unbranched filaments ¼–1 inch long on rocks and wharves between the tide-lines, has been found in Harrington Sound by Dr. Hervey.

Bangia compacta Zanard., which also occurs on rocks in Harrington Sound (*Howe 129*), appears to differ from the foregoing in having filaments that are only ½–1 line long and in its cells in the uniseriate vegetative parts (except base) being discoid, mostly 2–4 times as broad as long, closely compacted and *Lyngbya*-like, instead of being mostly as long as broad, as is the case in the Bermuda specimens referred to *B. fuscopurpurea.* In spite of their small size the filaments are often fertile and evidently mature.

Porphyra atropurpurea (Olivi) De-Toni (*Porphyra leucosticta* Thuret) has been reported by Collins as growing on mangroves (presumably close to the low-water mark) near the Flatts Bridge and Ely's Harbor (Phyc. Bor.-Am. *1927* and *2085*). It forms a thin oblong membranous pink thallus only one cell in thickness. The species is monoecious; the antheridia form decolorate patches among the darker sporocarps, both appearing first near the margins of the thallus.

Erythrotrichia carnea (Dillw.) J. Ag. forms a commonly sparse and inconspicuous fringe of exceedingly delicate rose-colored or reddish filaments on other marine algae (*Polysiphonia, Hypnea,* etc.) and on marine spermatophytes.

The filaments are usually only a line long or less. Under a compound microscope they are seen to be unbranched and to consist commonly of a single row of cells, which are mostly about as broad as long. In older conditions the filaments may become more than one cell broad.

Family **NEMALIONÀCEAE.**

Acrochaetium crassipes Børg. This species was originally described from the Danish West Indies. It is a very minute plant, only a few cells high, with a few branches 1–6 cells long. It occurs as a microscopic epiphyte on *Centroceras clavulatum* at St. David's Island. (Phyc. Bor.-Am. *2033.*)

Acrochaetium infestans Howe & Hoyt, is a microscopic filamentous plant, of which the vegetative parts are chiefly endozoic, creeping in the gelatinous or chitinous stalks and stolons of hydroids and of filamentous bryozoa. The interior filaments are freely and irregularly branched, usually in a loose rambling intricate fashion, but occasionally forming a sort of pseudoparenchyma with shorter, more compacted cells. The monosporangia are borne on external filaments, which are commonly very short and few-celled, simple or with a few short branches, or occasionally reduced to a single exserted monosporangium. [Phyc. Bor.-Am. *2194*, as *Rhodochorton membranaceum.*]

Acrochaetium (*Chantransia*) is a genus of small, filamentous, chiefly epiphytic, endophytic, epizoic, or endozoic red algae. It is doubtless represented in Bermuda by several other species, the determination of which awaits critical study. One of these, in and on *Dudresnaya crassa,* has been distributed by Collins as **Chantransia corymbifera** Thuret* (Phyc. Bor.-Am. *1880.*)

Trichogloea Herveyi Setchell (Phyc. Bor.-Am. *2031*) is a more or less calcified, very lubricous, irregularly branched plant, reaching a length of four or five inches. No diagnosis of the species has been published up to the date of writing. It occurs at or below low-water mark, as at Cooper's Island. Endemic.

Helminthocladia Calvadosii (Lamour.) Setchell, more commonly known as *Helminthocladia purpurea* (Harv.) J. Ag., appears to occur in the spring months at Long Bird Island (*Collins,* Phyc. Bor.-Am. *2035*) and at Bailey's Bay (*Wadsworth*). Though not calcified, it is rather firmer in texture and a little less lubricous than the *Trichogloea Herveyi* and is more brownish red or greenish red (less pink) in color. The Bermuda plant differs somewhat in habit from the European, but in other respects seems to offer little or nothing to distinguish it.

Liagora valida Harv. grows on surf-swept rocks between the tide lines, as at Hungry Bay, Cox's Bay, Achilles Bay, and St. David's Island. In this

* To a French plant, hemi-endophytic in *Helminthocladia Calvadosii* and described and figured by Bornet and Thuret under the name *Chantransia corymbifera* Thuret, the Bermudian plant in *Dudresnaya* bears considerable resemblance. However, the original description of *C. corymbifera* apparently confused two species, though only one of them, an epiphyte on *Ceramium rubrum*, was actually cited. This epiphyte on *Ceramium*, which has been renamed [*Chantransia Thuretii* (Bornet) Kylin], should manifestly be considered the type of *Chantransia corymbifera* Thuret.

genus the thallus is usually terete, repeatedly forked, or sometimes subpinnate or laterally proliferous, more or less calcified, and is usually lubricous when living, at least in the younger parts. Some of the species of *Liagora* bear a superficial resemblance to certain Corallinaceae, but the Liagoras are more lubricous and when examined under a microscope after decalcification with an acid the thallus is seen to be more distinctly and loosely filamentous in structure, with a more sharply defined central strand of filaments. *L. valida* forms dense tufts or clusters, mostly 2–5 inches high or long; the thallus is many times forked, the numerous branches being about half a line in diameter; the older parts are solidly encrusted with lime, are white, and become transversely cracked or irregularly jointed; the color of the younger parts varies from pink to brownish red. Small superficial spots, less calcified, usually concave and waxy in the dried condition, and easily visible under a hand-lens, mark the position of the immersed cystocarps. (Phyc. Bor.-Am. *1929.*)

Liagora ceranoides Lamour. is more slender, more lubricous, and more divaricately dichotomous than the preceding. The calcification appears under the hand-lens to take the form of scaly or mealy flakes instead of a more or less continuous crust. The plant occurs on rocks near the low-water line in Castle Harbor, etc. The type of the species was from the island of St. Thomas in the Danish West Indies. The later-described *Liagora pulverulenta* Ag. as currently (and, with little doubt correctly) interpreted is apparently the same species. (Phyc. Bor.-Am. *1928*, as *Liagora pulverulenta.*)

Species of *Liagora* other than the two mentioned certainly occur in Bermuda, but their determination awaits critical study. A not uncommon species has been referred sometimes to *Liagora elongata* Zan., originally described from the Red Sea, and sometimes to *L. Cheyneana* Harv., originally described from western Australia. Possibly *L. farinosa,* a name applied by Lamouroux in 1816 to a plant from the Red Sea, will be found to be available for it. This plant is less regularly dichotomous than either *L. valida* or *L. ceranoides* and commonly shows numerous lateral proliferations. The peripheral filaments project more or less beyond the zone of calcification and form a reddish nap on the surface. The plant is coarser than *L. ceranoides* and much less calcified and less rigid than *L. valida.* Under the microscope it differs from both in the broader cells of the less moniliform peripheral filaments, in the dense globose tufts of antheridia, etc.

Family **CHAETANGIÀCEAE.**

Galaxaura is a genus of more or less calcified algae, the plants, however, being less thoroughly calcified and more flexible, at least when fresh, than plants of the family Corallinaceae. They are, for the most part, coarser plants than the Liagoras and usually have a firmer more obvious cortex.

Galaxaura subverticillata Kjellm. is a shaggy, reddish brown or sordid green plant with its longer assimilatory filaments in more or less distinct whorls, especially toward the apices. It apparently represents the tetrasporic phase of *G. rugosa* (Ell. & Soland.) Lamour., not yet reported from Bermuda. It has been found on rocks in shallow water at Red Bay, St. David's Island.

Galaxaura flagelliformis Kjellm. is similar to the foregoing, but has more elongate branches and the longer assimilatory filaments are tufted, crowded, or irregularly disposed without any obvious tendency to a whorled arrangement. It probably represents the tetrasporic phase of *G. squalida* Kjellm., with which it occurs at Bethel's Island (*Collins 8486*). In the West Indies, *G. subverticillata* and *G. flagelliformis* seem sometimes to intergrade, as do also their probable sexual phases, *G. rugosa* and *G. squalida.*

Galaxaura squalida Kjellm. has usually a smooth firm cortex, though parts of the surface often bear few or numerous free assimilatory filaments. It occurs on rocks and washed ashore at Hungry Bay, Gravelly Bay, Bethel's Island, etc., forming greenish, reddish green, or finally whitening tufts or clusters mostly 2–4 inches high. It has terete, regularly dichotomous branches, about $\frac{1}{16}$ in. wide or a little more, commonly collapsing or flattened towards the apices on drying. (Phyc. Bor.-Am. *1882.*)

Galaxaura marginata (Ell. & Soland.) Lamour. has a dark red, grayish red, or greenish red thallus that is for the most part strongly flattened even when living. Its sexual phase (*G. occidentalis* Børg.) has a firmer cortex and often a more shiny surface than the tetrasporic plant, and from certain parts of its epidermis, especially at or near the margins, there grow out few or numerous papilla-like cells, making darker roughened areas, barely visible under a hand-lens. (Phyc. Bor.-Am. *1930*, as *Brachycladia marginata.*)

Galaxaura obtusata (Ell. & Soland.) Lamour. has a coarse, terete, smooth dichotomous thallus 2–5 inches long, its segments $\frac{1}{16}$–$\frac{3}{16}$ inches in diameter, usually constricted and jointed at either end, and often tapering towards either end. It is more rigid and fastigiate than *G. squalida,* and its forkings are wider-angled. It occurs unattached in fish-ponds, etc. near Tucker's Town, where it is often less calcified than when growing under normal conditions in deeper water, as met with in the West Indies. (Phyc. Bor.-Am. *1881.*)

Family **GELIDIÀCEAE.**

Wrangelia penicillata (Ag.) Ag. is one of the delicate feathery or "mossy" red seaweeds. Its tufts reach a height or length of 2 to 6 inches. Its usual color is a dull red or brownish red, becoming blackish with age or partial decay. The thread-like, almost microscopic, branchlets are in regular whorls, as may be determined with a hand-lens, and towards the sometimes subcircinate apices of the main branches they are often tufted or subsecund. The species occurs in warm shallow bays, as at Spanish Point, Ely's Harbor, Achilles Bay, and Harrington Sound. (Phyc. Bor.-Am. *1883.*)

Naccaria corymbosa J. Ag. bears some resemblance to the above in general habit, but is a rather smaller plant, mostly 1 to 2 inches high, is less likely to darken on drying, and the branch system is alternate throughout. The ultimate branchlets are so short, minute, and crowded as to be demonstrable only with a compound microscope. The larger branchlets that are visible with a hand-lens are slender and taper-pointed, and do not have the tufted-plumose appearance of the corresponding branchlets of *Wrangelia*

penicillata. *N. corymbosa* was originally described from Key West, but it has recently been found in Bermuda by Hervey (Buildings Bay, Phyc. Bor.-Am. *2036*) and by Collins (St. George's).

Gelidium crinale (Turn.) J. Ag., like other species of *Gelidium*, has none of the exceedingly delicate, almost microscopic filaments that characterize the two preceding genera. It forms dark red or blackish mats 1 to 3 inches high, the lower parts terete or slightly flattened, scarcely coarser than a bristle, the numerous mostly flattened branches and branchlets irregularly two-ranked, the ultimate often spatulate, becoming $\frac{1}{3}$–$\frac{1}{4}$ of a line broad. It occurs on stones and rocks near low-water mark, as at Walsingham and at Dingle Bay. (Phyc. Bor.-Am. *2089*.)

Gelidium caerulescens Kütz. (?). The type of this species came from New Caledonia in the South Pacific, but a more or less similar plant occurs in Bermuda and the West Indies. Its branches are broader ($\frac{1}{4}$–$\frac{1}{2}$ line) than those of the preceding and are rather more regularly disposed, and the color of the plant is more red-purple and often iridescent.

Gelidium pusillum conchicola Piccone, creeps on shells of mussels, etc., its linear or spatulate ascending branches being usually only $\frac{1}{8}$ of an inch high or less, and $\frac{1}{4}$–$\frac{1}{3}$ of a line broad. (Phyc. Bor.-Am. *2183*.)

Gelidium rigidum (Vahl) Grev. [*Gelidiopsis rigida* (Vahl) Web.-v. Bosse] is a rather coarse rigid cartilaginous plant with a repent base and regularly or often very irregularly pinnate or bipinnate erect branches 1–3 inches high. It has been placed by most recent writers in the genus *Gelidiopsis* of the family Sphaerococcaceae, though in absence of known cystocarps its generic position is not wholly clear. In the character of its apical cell and of its usually indistinct central axis it does not seem very different from *Gelidium cartilagineum*, which is allowed to remain in this genus, but it diverges from typical species of *Gelidium* in having a thallus that is essentially terete throughout and in the often irregularly disposed, not always two-ranked branches. The tetrasporangia occur on somewhat enlarged conic or conic-terete apices of some of the ultimate branchlets, easily recognizable under a hand-lens. It has been found in tide-pools and on stones in shallow water, as at Harris Bay, in the Walsingham region, etc. (Alg. Exs. Am. Bor. *142*, and Phyc. Bor.-Am. *2090*.)

Family **GIGARTINÀCEAE.**

Gigartina acicularis (Wulf.) Lamour. forms tangled tufts 1½–3 inches high. It has a dark red, subterete or slightly flattened, freely and irregularly branched thallus, mostly $\frac{1}{4}$–$\frac{1}{2}$ line broad, with awl-shaped or taper-pointed, often recurved, ultimate branchlets. This widely distributed species has been found by Collins on flat rocks overhung by a cliff at Tucker's Town. (Phyc. Bor.-Am. *1884*.)

Family **RHODOPHYLLIDÀCEAE.**

Catenella Opuntia pinnata Harv. is a small red-purple plant, mostly $\frac{1}{2}$–1 inch long, dichotomous, trichotomous, or subpinnate, more or less narrowed or

constricted at the nodes, subterete in lower parts and strongly flattened above, the ultimate segments mostly ¼–½ of a line wide, lanceolate, oblong, spatulate, obovate, or linear. It is commonly found creeping on the roots of mangroves near the high-water mark, making solid mats or more often intertangled with *Caloglossa*, *Bostrychia* and other algae, as at Walsingham and Hungry Bay. (Phyc. Bor.-Am. *1885*.)

Eucheuma isiforme (Ag.) J. Ag. is a coarse, spiny, much-branched, coralline-red seaweed, forming shrubby tufts from six inches to a foot or more in diameter, with the main axes ⅛–¼ inch in diameter when fresh. Its more or less whorled ultimate ramuli may be elongate and awl-shaped or short, thick, and merely acute or sometimes blunt. In weathering and fading its color may become scarlet, or yellowish before it reaches its final whitish or translucent condition. The plant has a firm horn-like consistency on drying. It is frequently found growing on rocks or washed ashore in shallow bays, as at Hungry Bay, Bailey's Bay, Tobacco Bay, Tucker's Town, etc. (Phyc. Bor.-Am. *1886*.)

Eucheuma Gelidium (J. Ag.) J. Ag. is somewhat similar to the foregoing in size, color, cartilaginous consistency, and spiny habit, but the main axes are decidedly flattened and the branches are pronouncedly two-ranked. It has been found at Harris Bay and on St. David's Island by Hervey. (Phyc. Bor.-Am. *2184*.)

Wurdemannia setacea Harv. forms densely intertangled dark red mats on rocks, on the stalks of Gorgonians, and among the larger algae. The thallus has about the diameter of a horse-hair, is very irregularly branched, and the branches usually cohere and anastomose freely, so that the filaments are not readily separated. Under a hand-lens the rather short ultimate branchlets are mostly acute. On drying, the plant is rather rigid and it does not adhere very well to paper when dried under pressure. It has been found in Hamilton Harbor, at Walsingham, and in Harrington Sound. (Phyc. Bor. Am. *1887a*.)

Family **SPHAEROCOCCÀCEAE.**

Gracilaria ferox J. Ag. has a copiously branched thallus, with main axes mostly ¼–½ a line broad. These axes are usually distinctly flattened and the branching manifestly disticho-dichotomous, but conditions occur in which the axes are very slightly if at all flattened and in which the branches emerge in nearly all directions. In the latter case the plants bear some resemblance to *Hypnea musciformis*, but may be distinguished microscopically by the scattered instead of localized tetrasporangia. The ultimate branchlets are acute or taper-pointed. The species is rather common in shallow bays. (Phyc. Bor.-Am. *1932*.)

Gracilaria mammillaris (Mont.) M. A. Howe (*Rhodomenia mammillaris* Mont. Ann. Sci. Nat. II. 18: 252. 1842) has a flat deep red flabellately subdichotomous thallus with segments mostly 1–4 lines broad and the ultimate lobes usually rounded-obtuse. It is of occasional occurrence on rocks in

shallow water on St. David's Island, in the bays of St. George's, and on the South Shore. (Phyc. Bor.-Am. *1931*—as *Gracilaria dichotomo-flabellata* Crouan.)

Gracilaria horizontalis Collins & Hervey, is a thick, tough, fleshy, cartilaginous plant, expanding horizontally from a central irregular disc, with short thick crowded scarcely attenuate branches, and closely adherent to the substratum or its overgrown parts by coarse haptera. The plant seems, from the authors' description, to be closely related to *Gracilaria crassissima* Crouan (J. Ag. Sp. Alg. 3^1: 78. 1901—type from Guadeloupe), if not identical with it.

Hypnea musciformis (Wulf.) Lamour. is a copiously and somewhat virgately branched dusky red plant with terete main axes about $\frac{1}{3}$ of a line in diameter. Its longer filiform branches are often hooked or incurved at the apex and act somewhat like tendrils in grasping other algae or other branches of its own kind. Its shorter branchlets are taper-pointed and sometimes a little spine-like. It occasionally resembles the narrower more terete conditions of *Gracilaria ferox,* but the tetrasporangia, as in other species of *Hypnea,* are confined to somewhat swollen spear-like branchlets instead of being scattered through the cortex in general, and under a compound microscope the tetraspores are seen to be arranged in rows of four (zonate) instead of in collateral pairs (cruciate). (Phyc. Bor.-Am. *2185.*)

Hypnea spinella (Ag.) Kütz. forms low densely intertangled dark red or scarlet mats or cushions on rocks in shallow water in Hamilton Harbor. Its main axes are terete, angular, or slightly flattened, about $\frac{1}{8}$ of a line in diameter, and it has numerous short sharp-pointed branches that become rigid and spiny on drying, giving the plant somewhat of the aspect of a miniature *Eucheuma.* The tetrasporangia are borne on spool-shaped or conic, usually rostrate, enlargements of short branchlets.

Family **RHODYMENIACEAE.**

Cordylecladia irregularis Harv. is a rather rigid irregularly branched thread-like plant (about $\frac{1}{4}$–$\frac{1}{3}$ of a line in diameter) that forms dense mats or creeps among other algae near the low-water mark. When living its color is a greenish or brownish red with touches of a steel-blue iridescence. Its branching is usually very irregular but often shows a tendency to a secund arrangement; occasionally opposite branches are found. The tetrasporangia occur on pod-like enlargements of the ends of certain branchlets. The species sometimes bears a slight resemblance to *Wurdemannia setacea,* but it is coarser, the branches are less acute and apparently do not anastomose; and the filaments are hollow, as may be determined by examination of cross-sections with a hand-lens. It scarcely adheres to paper on drying. [Phyc. Bor.-Am. *2186,* as *C. rigens* (Ag.) Collins & Hervey.*]

Chrysymenia uvaria (L.) J. Ag. may be recognized by its suggestiveness of elongate, branched, usually lax clusters of red or brownish-red grapes. In

* The type of *Sphaerococcus rigens* Ag. is a Japanese plant different in structure from the Bermudian and West Indian.

form it is slightly suggestive of conditions of *Caulerpa racemosa* (both occur under one name in the Linnaean herbarium), but the *Chrysymenia* is red, unless decolorate, while the *Caulerpa* is green. The plant is commonly 3 to 8 inches tall and the subglobose, obovoid, or occasionally subpyriform hollow vesicles that form the ultimate branchlets are mostly 1½–3 lines long. The American plants appear to be larger in all respects than those of the Adriatic and Mediterranean seas. This species occurs in Harrington Sound and in Castle Harbor. (Alg. Exs. Am. Bor. *150;* Phyc. Bor.-Am. *1933.*) It usually inhabits rather deep water.

Chrysymenia pyriformis Borg. resembles the foregoing, but is a smaller plant (1–2 inches high) with vesicles that are larger (½–¾ inch long) and more uniformly pyriform. It has been found at Tucker's Town by Collins.

Lomentaria uncinata Menegh. [*Hooperia Baileyana* (Harv.) J. Ag.] is a hollow, thread-like, irregularly branched plant, sometimes slightly resembling *Cordylecladia irregularis*, but is deeper red and always softer, more gelatinous, and adheres firmly to paper on drying. It is also usually more slender and delicate, its branches being mostly ⅛ to ¼ of a line in diameter. Its longer branches or axes are often arched or recurved, with the branchlets in a more or less secund series on the convex side. Both the generic position of the American plant and its identity with the little-known Adriatic and Mediterranean species with which it is currently associated have been called in question and both points deserve further study. The plant has been found at Hungry Bay by Collins and in the Walsingham region by Hervey.

Champia parvula (Ag.) Harv. forms subglobose tufts 1–4 inches in diameter on *Thalassia, Zostera,* the larger algae, and on rocks. Its main axes are mostly ¼–½ a line in diameter and its branches are irregularly and variously disposed, being alternate, opposite, or sometimes whorled. The plant is obviously jointed-nodose throughout, the barrel-shaped internodes in the older parts being mostly 1½ times as long as broad; microscopic examination shows that the internodes are hollow, with a septum or diaphragm at each node. The plants are somewhat gelatinous and adhere firmly to paper on drying, yet they do not collapse when taken from the water. The species has been found in Harrington Sound. (Phyc. Bor.-Am. *1934.*)

Coelarthrum Albertisii (Picc.) Borg. has a jointed, hollow, septate thallus, somewhat like that of *Champia,* but the branching is dichotomous, the constrictions are deeper, the internodes or segments are more ellipsoid or obovoid, and the consistency is more gelatinous. It is also, so far as known, a smaller plant, attaining a height of scarcely more than one inch, with broader segments, these mostly 1–3 lines broad. The type of the species was from the Canary Islands. It seems that the species was first found in Bermuda by Farlow who got it in 1881 at Ducking Stool near Hamilton and at Cooper's Island. Hervey has since found it at Buildings Bay (Phyc. Bor.-Am. *2091*) and at Bailey's Bay.

Family **DELESSERIACEAE.**

Nitophyllum Wilkinsoniae Collins & Hervey (Phyc. Bor. Am. [illegible]) is a recently published species apparently related to *N. ocellatum* (Lamour.) Grev. It was found growing on rocks below low-water mark at Dingle Bay. Endemic.

Caloglossa Leprieurii (Mont.) J. Ag. creeps on rocks, wooden piles, mangrove roots, and other solid objects between the tide-lines, mostly near the high-water mark (Phyc. Bor.-Am. *2038*). It has a thin, purple, membranous, costate, dichotomous, rather regularly constricted thallus that commonly reaches a length of 1 or 2 inches, with segments mostly ½–1 line in maximum width. The segments of the terminal forkings, which are commonly unequal at first, are lanceolate or elliptic and are acuminate. The segments in general are constricted at the base, either gradually or abruptly. A tuft of root-hairs is usually to be found on the ventral surface at each forking of the costa. Although typically an inhabitant of salt or brackish water, this species is found also in mountain streams in Porto Rico at an elevation of 1200 or 1500 feet.

Taenioma perpusillum (J. Ag.) J. Ag. has been reported from Bermuda (Phyc. Bor.-Am. *1935*), but the writer has seen no Bermuda specimen. The one copy of Phyc. Bor.-Am. *1935* that has been examined shows a small Rhodomelaceous plant bearing some slight resemblance to the *Taenioma*.

Family **RHODOMELÀCEAE.**

Laurencia obtusa (Huds.) Lamour. The species of *Laurencia* as currently recognized appear to intergrade. Although many of the alleged species are different enough in their typical conditions, individual specimens are often difficult to place. Of the six Bermudian species or forms, *L. obtusa* is perhaps the commonest, growing in tide-pools or in shallow water on rocks and reefs. It forms conic, subpyramidal, or subglobose tufts, mostly 2–7 inches high, and when living is often greenish with pink tips. Pressed specimens sometimes have the appearance of being 3–6 times irregularly pinnate, but the branches and branchlets are in various planes and for the most part alternate, though at times apparently opposite or verticillate. The plants have well-developed main axes that are mostly ¼–½ a line in diameter. (Phyc. Bor.-Am. *2092*.)

Laurencia intricata Lamour. (*L. implicata* J. Ag.) is perhaps a variety of the foregoing, differing chiefly in the lax, weak intertangled habit of growth and the lack of clearly defined leading axes. It occurs unattached or loosely attached to other algae or to rocks, as at Gibbet Island and Tobacco Bay.

Laurencia microcladia Kütz. (*L. glomerata* Suhr, not *L. glomerata* Kütz.) also is possibly a variety of *L. obtusa* but the two occur near each other in Bermuda and maintain a considerable degree of distinctness. *L. microcladia* is distinguished by the narrowly virgate habit of the plant as a whole or of its principal branches and by its minute, numerous, often clustered clavate or clavate-turbinate ultimate ramuli. It occurs on rocks between the tide-lines at Achilles Bay, at Spanish Rock, and at Hungry Bay and other points along the South Shore (Phyc. Bor.-Am. *1888*, as *L. obtusa*, var. *gelatinosa*). It is a small plant, 1–3 inches high.

Laurencia Poitei (Lamour.) M. A. Howe (*Fucus Poitei* Lamour. Diss. 63. *pl. 31. f. 2, 3.* 1805; *Laurencia Chauvini* Bory, Dict. Class. Hist. Nat. 9: 239.

1826; *L. tuberculosa* J. Ag. 1852; *L. gemmifera* Harv. 1853; *L. mexicana* Kütz. 1865.) This much-named species is usually easily recognizable, though its slenderer more freely branched conditions sometimes approach forms of *L. obtusa*, while its simpler conditions may sometimes bear a superficial resemblance to *L. papillosa*. It is coarser than *L. obtusa* and its branches are more inclined to be distichous. Its numerous short tubercle-like branchlets, which are less crowded than in the following species, are one of its characters. The Bermuda specimens seen are not wholly typical. Specimens that seem to belong here have been collected at Red Bay, St. David's Island, and at Tobacco Bay, St. George's.

Laurencia papillosa (Forsk.) Grev. is a widely distributed species that is common on rocks near the low-water mark in Bermuda and the West Indies. It ordinarily grows 1–5 inches high, is sparingly and irregularly branched or once or twice subpinnate, the main branches bearing usually crowded wart-like, button-like, subglobose, or short-truncate-clavate ramuli, which are irregularly disposed on all sides or somewhat 4-ranked and are simple or bear still smaller similar branchlets. Not only do the plants as a whole seem to the naked eye to be papillate or adorned with numerous pegs, but in certain individuals, especially in those growing in exposed positions between the tide-lines, the younger superficial cells, under a compound microscope, are seen to be strongly aculeate-papillate.

Laurencia Corallopsis (Mont.) M. A. Howe (*Sphaerococcus corallopsis* Mont. in Sagra, Hist. Cuba. Bot. Pl. Cell. 49. 1842 (French ed.); in Sagra, Ic. Pl. Fl. Cuba, *pl. 3. f. 1.* 1863; *Laurencia cervicornis* Harv. Ner. Bor.-Am. 2: 73. pl. 18. *f. C.* 1853). This species appears to be the most distinct of any of the West Indian forms of *Laurencia*, differing from the others in its dichotomo-cormybose or cervicorn habit of branching, with few or numerous lateral proliferations. It grows 2–6 inches tall and its main axes are mostly ½–1 line in diameter. It occurs on rocks in shallow water at Buildings Bay, Red Bay, Tobacco Bay, etc. (Phyc. Bor.-Am. *2187*, as *L. cervicornis* Harv.)

Laurencia perforata Mont., a species originally described from the Canary Islands, has been recently reported from the Bermudas (Phyc. Bor.-Am. *1889*), but the specimen distributed under that name in the one set of the Phycotheca examined has not the apical vegetative structure of a *Laurencia* or of any other member of the Rhodomelaceae.

Chondria curvilineata Collins & Hervey, is a straggling, rather inconspicuous, irregularly branched plant, scarcely more than an inch long, that forms tangled mats in shallow water, as at The Flatts, Heron Bay (Phyc. Bor.-Am. *2039*), and in a mangrove swamp near Hamilton. Its ultimate ramuli are long-clavate and obtuse. The most remarkable character of the species, determinable with the aid of a compound microscope, is found in the thickened crescentic transverse septa separating the members of the polysiphonous axis, these crescents, with their convexities towards the plant-apex, being easily visible through the overlying cortex. The species of *Chondria* may usually be distinguished from those of *Laurencia* under a hand lens by the much narrowed often decolorate necks of the commonly more slender ultimate ramuli, and in Bermuda the species of *Chondria* are more slender, less

succulent, more irregularly branched, and more intricately intertangled than are those of the genus *Laurencia*. Apparently endemic.

Chondria polyrhiza Collins & Hervey, is somewhat like the foregoing in general habit, but is rather larger, more dusky red, even more irregular in its branching, more intertangled in habit of growth, and its ultimate ramuli are taper-pointed. It lacks the conspicuous thickened crescentic transverse internal septa of *C. curvilineata*, though it often shows somewhat similar longitudinal or irregularly disposed thickenings, and it develops frequently ventral or latero-ventral multicellular haptera, indicating a creeping habit. (Phyc. Bor.-Am. *2040*.) Apparently endemic.

Acanthophora spicifera (Vahl) Børg. is common in shallow bays, tidal streams, and tide-pools (Phyc. Bor.-Am. *1938*). It grows usually 3 to 8 inches tall, is a dusky red or purple when living, often blackens on drying, is irregular and often sparing in its main ramification, and the wand-like main branches are clothed with more or less 4-ranked subulate ramuli, mostly ½–2 lines long, which are beset with minute, single or clustered, patent or reflexed spines.

Digenea simplex (Wulf.) Ag. is a shaggy, rigid, tawny- or dingy-red, rather unattractive, irregularly dichotomous plant that commonly grows 1–4 inches high, being found especially in tide-pools and on sand-covered rocks near the low-water line, as along the South Shore (Phyc. Bor.-Am. *1939*). The branches, particularly in their upper parts, are more or less densely clothed with mostly simple rigid filaments that are usually 1–4 lines long and that appear transversely segmented under a hand-lens. The main branches, thus clothed, are sometimes suggestive of fox-tails or of *Lycopodium Selago*.

Polysiphonia ferulacea Suhr, is probably the most common of the several Bermudian Polysiphonias that have four pericentral siphons. Its filaments are more or less rectangular-prismatic and its segments are often shorter than broad. The plant is commonly 1–4 inches high, tufted in habit, rather sparingly branched, subpellucid when living, and brownish red or fuscescent on drying. It grows in tide-pools and on rocks and stones just below the low-water line. It prefers somewhat agitated water, as on the rocks at Hungry Bay. (Phyc. Bor.-Am. *1940*.)

Polysiphonia havanensis Mont. is also a 4-siphoned species. It is more slender, softer, and more gelatinous than the preceding, and its segments are more terete and are relatively longer, the median and lower being often 2–3 times as long as broad. It is usually found in association with mangroves, near the low-water mark. (Phyc. Bor.-Am. *1941*.)

Polysiphonia macrocarpa Harv. is a name that has been adopted in the Phycotheca (Phyc. Bor.-Am. *2093*) for an extremely slender and delicate 4-siphoned species found coating the roots of mangroves between the tide-lines at Hungry Bay. It differs specifically, however, from the Irish plant to which Harvey gave this name in its more slender, more sparingly and more dichotomously branched filaments, its shorter segments, its violet-red color, etc. The only specimen examined was apparently sterile.

Polysiphonia foetidissima Cocks, has 7–9 pericentral siphons and segments mostly 1–2 times as long as broad. It is commonly 2–5 inches high and

of a brownish- or violet-red color. It has been found in Hamilton Harbor and near Hotel Frascati. (Phyc. Bor.-Am. *1890.*)

Polysiphonia opaca (Ag.) Zan. has 14–20 pericentral siphons and the median segments mostly 1–1½ times as long as broad. It is commonly 2–5 inches high and is of a brownish color, darkening with age. It grows in tide-pools on the South Shore, on rocks at Tucker's Town, etc. (Phyc. Bor.-Am. *1891.*)

Herposiphonia tenella (Ag.) Ambronn, is rather common, creeping on *Halimeda, Udotea, Sargassum*, etc. and on roots of *Rhizophora*. In habit, due chiefly to the length of its "short" branches, it varies greatly according to habitat, these branches being 20–50 segments long in the form on *Rhizophora* and mostly 12–25 segments long in the forms on algae, but intermediates apparently occur. The Herposiphonias differ from the Polysiphonias in their creeping habit, dorsiventral organization, the dorsally recurved and inrolled apex, and the "short" branches alternating in two regular dorsal rows. In both this species and the next, the segments show 8–10 pericentral siphons and are mostly 1–2 times as long as broad. In the present species there is a branch of some sort at nearly every node of the main axes, complete regularity being interfered with occasionally by suppression or abortion. (Phyc. Bor.-Am. *1943.*)

Herposiphonia secunda (Ag.) Ambronn, like the preceding, usually creeps on various algae (*Sargassum, Laurencia*, etc.). It is best distinguished by the less frequent branches, these commonly occurring at every third or fourth node. The "short" branches are usually shorter than in the preceding, being mostly 7–20 segments long. (Phyc. Bor.-Am. *2041.*)

Lophosipsonia obscura of current writers [not *Hutchinsia obscura* Ag.,* which is *Lophosiphonia subadunca* (Kütz.) Falkenb.] is rather common, forming dense felted mats about half an inch deep on rocks near the high-water mark. The primary axes creep, somewhat as in *Herposiphonia*, but the branches are less regular in their origin and development; the branches are endogenous in origin and are not laid down in a regular exogenous series at the apex of the main axis as in *Herposiphonia*. The Bermuda plant commonly has 10–12 pericentral siphons and its segments are mostly about as long as broad. The current specific name, though invalid, is here used, pending further studies of its synonymy. (Phyc. Bor.-Am. *1892.*)

Lophosiphonia Saccorhiza Collins & Hervey, is a new name that has recently been given (Phyc. Bor.-Am. *2042*) to a minute 4-siphoned plant that creeps on and among the utricles of *Codium*. It occasionally shows free parts that suggest the genus *Polysiphonia* rather than *Lophosiphonia*. *Polysiphonia codiicola* Zan. is perhaps a close relative.

Dipterosiphonia rigens (Schousb.) Falkenb. (*Lophosiphonia bermudensis* Collins & Hervey). This is a minute plant that creeps on *Sargassum*, *Lau-*

* Diatoms that coated Agardh's type specimen and obscured its structure are apparently responsible for this specific name.

rencia, Halimeda, and other algae, growing near the low-water mark, as at Hungry Bay. Its main axes have 5 or 6 pericentral siphons, its often short, divaricate, subulate or spinescent branchlets sometimes have only 4, and its tetrasporic branches often 7 or 8. The segments of the main axes are about as long as broad, sometimes longer, sometimes shorter, while those of the branches are commonly shorter than broad. The branches are 4-ranked, though occasionally they may have an illusory appearance of being 2-ranked. The branches, however, occur in alternating pairs, of which the more ventral of each pair becomes a ramified "long" branch, while the more dorsal of each pair becomes a simple "short" branch, in which respect *Dipterosiphonia* differs from *Herposiphonia* and *Lophosiphonia.* In the present species, as noted by Falkenberg, this regularity is often not manifest on account of the slight development of the "long" branches. In the free parts, also, the branches are only sparingly developed and their relations are obscure, but in the younger conditions and in creeping parts, the form and relations of the branches are manifest and the plant is a typical *Dipterosiphonia.*

Falkenbergia Hillebrandii (Born.) Falkenb. may be recognized by its having only 3 pericentral siphons, the siphons of one segment usually alternating regularly with the siphons of the next. The filaments are very slender, delicate, and flaccid and adhere firmly to paper on drying. The color is a reddish purple, tending sometimes to rose and sometimes to brown. The branching is lateral or pseudodichotomous. Not uncommon on other algae, sticks, etc., occurring particularly in association with mangroves and in the ponds of the Walsingham region. (Phyc. Bor.-Am. *2043.*)

Wrightiella Blodgettii (Harv.) Schmitz, is of occasional occurrence near low-water mark, as at Harris Bay and elsewhere along the South Shore. It is commonly 4–7 inches high, with a few plumose main axes that have the appearance of being distichously pinnate when dried and pressed, though the branches and branchlets are in reality spirally alternate in four ranks. The numerous short branches are mostly about $\frac{1}{8}$ inch long and are beset with minute conic or awl-shaped ramuli that are visible with a hand-lens. Filamentous monosiphonous branchlets that soon fall off also occur, alternating with the stouter ones. Except for these the plant is corticated throughout, a section showing four pericentral siphons. The tetraspores occur on the monosiphous branchlets. The cystocarps are short-stalked and urceolate and are conspicuous when present. (Phyc. Bor.-Am. *1942.*)

Wrightiella Tumanowiczi (Gatty) Schmitz. The types of both this species and the preceding came from Key West, Florida, where the two differ rather markedly in habit, *W. Tumanowiczi* being more flaccid, having more persistent monosiphonous branchlets and being almost destitute of the short branches (about $\frac{1}{8}$ inch long) that are responsible for the distichous-pinnate appearance of the main branches of dried specimens of *W. Blodgettii. W. Tumanowiczi* resembles slender conditions of *Dasya pedicellata,* while *W. Blodgettii* is slightly suggestive of lax forms of *Bryothamnion Seaforthii.* Under a microscope the texture of *W. Tumanowiczi* is rather more translucent

and the minute pointed ramuli are rather smaller, more slender, and more aculeate-subulate. The Bermuda specimens that have been referred (Phyc. Bor.-Am. *2095*) to this species show some of the indicated differences, yet it seems difficult to distinguish them with certainty from *W. Blodgettii*.

Murrayella periclados (Ag.) Schmitz, occurs on the roots of mangroves and in rock caverns between the tide-lines, commonly associated with species of *Bostrychia*. Its main axes are 1 or 3 inches long, free, erect or pendent, from rhizomatous bases, and are plumose with spirally alternating branches of various kinds. The main axes have 4 undivided and uncorticated pericentral siphons throughout, differing in this respect from species of *Bostrychia*. Some of the branches are simple and monosiphonous, others are branched and monosiphonous, others are short, branched, and polysiphonous at base, and monosiphonous above, and others are long and polysiphonous like the main axes. (Phyc. Bor.-Am. *2096*.)

Bostrychia tenella (Vahl) J. Ag. creeps on the walls of caverns, on shaded rocks, on roots of mangroves, and other objects, mostly near the high-water line or a little above it, often forming a dense, though usually thin, turf in the older parts of the colonies. The main axes are mostly ½–1 inch long and are twice or thrice pinnately branched, the somewhat palmato-pinnate ultimate branchlets ending in monosiphonous prolongations that are usually 10–40 cells long. The main axes and principal branches of this and of the other Bermudian species of *Bostrychia* are densely corticated. The tetraspores occur in cylindric-rostrate or lanceolate swellings (stichidia) of the primary or secondary corticated branches, these stichidia being 4–10 times as long as broad and moderately decurved. (Alg. Exs. Am. Bor. *137*, as *B. calamistrata;* Phyc. Bor.-Am. *1894a, b, c*—all more or less mixed with other species of *Bostrychia* in the set examined.)

Bostrychia Sertularia Mont. is found chiefly on the roofs of caverns above the ordinary high-water line. It is closely related to *B. tenella*, with which it is sometimes associated, but is apparently distinct. It is more slender and delicate in all its parts, the main axes are regularly and pectinately bipinnate, the ultimate branchlets are mostly 6-15 cells long, sometimes monosiphonous except at base, sometimes irregularly polysiphonous except for one or two cells at apex; in the monosiphonous parts, the cells are mostly broader than long, while in *B. tenella*, the reverse is true; when, as occasionally happens, the monosiphonous apices are more prolonged, the prolongations are commonly decolorate, which is rarely the case in *B. tenella*. The stichidia are ovoid or short-cylindric-clavate, mostly 2–4 times as long as broad, and are acute, obtuse, or apiculate. The color of the plant is a blue- or violet-purple, while that of *B. tenella*, even when growing with it, is a more brownish purple. (Alg. Exs. Am. Bor. *138;* Phyc. Bor.-Am. *2094*.) *Bostrychia Mazei* Crouan, at least as represented by Mazé & Schramm, Alg. Guad. *390* in herb. Mus. Paris, is this species.

Bostrychia Montagnei Harv. is a much larger plant than either of the two preceding species, being 1½–4 inches long, and, with its tri-quadri-pinnate

ramification, spreading about equally broad. Its branches are more widely spaced and not so obviously two-ranked. The apices are conspicuously inrolled; monosiphonous prolongations of the ultimate branchlets occur in the younger parts. The stichidia are cylindric-lanceolate, rostrate, and usually 4–6 times as long as broad. The blackish or violet-brown plants are ascending, or pendent rather than creeping. The species occurs in caverns and under shelving rocks, but is at its best on roots of mangroves, growing just below the high-tide mark, mostly at a lower level than *B. tenella*. (Alg. Exs. Am. Bor. *136;* Phyc. Bor.-Am. *1893*.)

Heterosiphonia Wurdemanni (Bail.) Falkenb. is a small plant, mostly ½–1 inch long or high, growing on other algae and on Gorgonians. The main axes have 4–6 (usually 5) pericentral siphons and are uncorticated throughout. These axes bear, usually at intervals of two segments, minute rather rigid branchlets which are monosiphonous throughout or polysiphonous at base and are several times divaricately dichotomous. These branchlets are primarily 2-ranked and alternate, but this regularity is sometimes interfered with by the development of adventitious or secondary branchlets. The cells of the branchlets are mostly a little longer than broad. The stichidia are ovoid-conic or obpyriform, about twice as long as broad, provided with a one-celled apiculus, and subsessile on a pedicel that is unicellular, at least as to its basal segment. (Phyc. Bor.-Am. *2097*.)

Dasya corymbifera J. Ag. is usually 1½–2½ inches long and grows under shelving rocks near the low-water mark. In the pressed and dried condition it shows a vaguely pinnate mode of branching. The main branches, together with their small, spirally alternate, monosiphonous, several times dichotomous, fasciculate-corymbose branchlets, are ½–1 line broad. The branchlets taper decidedly and the ultimate divisions are, for the most part, strongly incurved or subfalcate. The main axes are strongly corticated, and in the uncorticated upper parts the segments are a little longer than broad, the individual pericentral siphons being usually 3–6 times as long as broad. Cells of the branchlets are 2–5 times as long as broad. The stichidia are conic-subulate, on monosiphonous pedicels 1 or 2 (rarely 3) cells long.

Dasya Collinsiana M. A. Howe, sp. nov. Plants dingy red, often yellowish on drying, forming rather dense subhemispheric tufts 1–3 cm. high, 5–8 times subdichotomous, the branches corymbose or somewhat fastigiate, the terminal (with branchlets) alopecuroid, and 1–1.5 mm. in diameter; main axes 0.5–0.75 mm. in diameter near base, densely but rather pellucidly corticated up to the last two or three dichotomies; segments of upper uncorticated or lightly corticated parts often poorly defined owing to overlapping of siphons, varying from one half as long as broad to slightly longer than broad, the five pericentral siphons translucent, conspicuous, varying from slightly longer than broad to 2–3 (rarely 4) times as long as broad, often subquadrate; branchlets monosiphonous, patent, divaricate, or subsquarrose, 0.5–0.9 mm. long, 4 or 5 times divaricately dichotomous, the lower rigid and slightly tapering, those of the terminal coma softer, connivent, more tapering and often short-piliferous; basal cells of the branchlets 100–130 μ in diam., commonly shorter than broad, the terminal and subterminal cells mostly 45–55 μ in diam. (except in apical coma), about twice as long as broad; stichidia alopecuroid, acuminate-

apiculate, 300–350 μ long, 90–130 μ broad, 2–4 times as long as broad, subsessile on a very short one-celled pedicel.

Growing on rocks and on *Sargassum,* near low-water mark. Type from Red Bay, St. David's Island (*Howe 293*, in herb. N. Y. Bot. Gard.). This species is most nearly related to the Adriatic and Mediterranean *Dasya rigidula* (Kütz.) Ardiss. (which apparently has been sometimes confused with *Heterosiphonia Wurdemanni*), and to the European species that currently bears the invalid name *Dasya Arbuscula*,* but it differs from both in the dichotomo-corymbose arrangement of its main branches and in the short, broad, pericentral siphons, which commonly appear almost quadrate. Bermuda specimens have recently been referred, sometimes to *D. Arbuscula* and sometimes to *D. ramosissima* Harv. From the latter it differs in its small size, dichotomo-corymbose habit, mostly shorter pericentral siphons, more rigid, and more divaricately forked branchlets, etc. In its rigid divaricately forked branchlets, the species suggests *Heterosiphonia Wurdemanni*, but is readily distinguished by the cortication of its main branches and by the spirally alternate instead of distichous ramification. Its nearest Bermuda relative is *D. corymbifera* J. Ag., from which it is best distinguished by the dichotomo-corymbose arrangement of its main branches, its shorter pericentral siphons, its more crowded, more divaricately forked, less tapering branchlets, which show little or no tendency to be incurved or falcate at their apices, and by its more sessile, more apiculate stichidia. Apparently endemic. The species is dedicated to Mr. F. S. Collins, the well-known American phycologist and co-author of the recently published treatise on "The Algae of Bermuda."

Dasya pedicellata Ag. [*D. elegans* (Mart.) Ag.] is the largest of the Bermudian members of the genus, being commonly from six inches to two feet long, with long unequal irregular branches, which may remain simple or may be again branched. The main axes are mostly ½–2 lines in diameter. All parts, with the occasional exception of the oldest, are densely clothed with tufts of dichotomous monosiphonous ramelli 1–4 lines long. The plants are flaccid and are reddish purple or lake-red. Cystocarps conspicuous, urn-shaped, borne on the main branches on pedicels of about half their own length. Tetrasporic stichidia ovoid-rostrate to lanceolate-subulate, often slightly curved, borne on the monosiphonous ramelli.

Dasya spinuligera Collins & Hervey, resembles small, slender, delicate, much-branched, less villous conditions of *D. pedicellata*, but most of the monosiphonous ramelli are borne on rather rigid subulate branchlets, such as are wanting or of rare occurrence in the typical *D. pedicellata*. And the species differs markedly in the much elongate, cylindric, often clustered stichidia, which are 5–10 times as long as broad. (Phyc. Bor.-Am. *2188*.) Endemic.

Family **CERAMIACEAE.**

Ptilothamnion bipinnatum (Collins & Hervey) M. A. Howe (*Gymnothamnion bipinnatum* Collins & Hervey, Proc. Am. Acad. Arts & Sci. 43: 139. *pl.*

* The type of *Conferva Arbuscula* Dillw., on which *Dasya Arbuscula* Ag. was based, is evidently a *Callithamnion*.

4. f. 26. Au 1917), is an exceedingly minute, almost microscopic plant that creeps on rocks in caverns in company with other algae. It is monosiphonous and uncorticated throughout. The creeping parts are attached by discs or manifest rhizoids; the erect, ascending, or semiprostrate, flexuous main branches are less than a line long, and have a more or less elongate naked stipe above which they are regularly and oppositely pinnate or somewhat bipinnate, the pinnae patent or somewhat divaricate, mostly 4–12 cells long, usually a pair from the upper part of each internode. In the more or less bipinnate conditions, the pinnules, 1–4 cells long, are chiefly confined to a secund row along the upper (inner) side of the pinna. Occasionally a pinna will develop more luxuriantly, like one of the main suberect branches. Cells of the rhizome are mostly 1½–4 times as long as broad, those of the main suberect axes 1½–2 times as long as broad. Tetrasporangia occur at the ends of the pinnae and are tetrahedrally divided (tripartite). The nearest relative of this species is perhaps the Irish cave-inhabiting *Ptilothamnion lucifugum* Cotton, from which, however, it is amply distinct. The Bermuda plant was found by F. S. Collins in a cave by the Ducking Stool. (Phyc. Bor.-Am. *2190*, as *Gymnothamnion bipinnatum* Collins & Hervey.) Apparently endemic.

Spermothamnion gorgoneum (Mont.) Bornet, is a name that may be used tentatively for a plant that forms a delicate red-purple plush on the surface of species of *Codium* (Bethel's Island, *Collins 8488*). The plant is monosiphonous and uncorticated throughout, sending up erect somewhat flexuous branches less than a line long from a creeping basal filament, the erect branches simple or rather sparingly laterally or subdichotomously ramified, the branchlets often subsecund, very rarely opposite or 3-verticillate. The cells are mostly 3–7 times as long as broad. The Bermuda specimen examined seems to be sterile, as was also, apparently, the African type of the present species. The Bermuda plant is manifestly different from the cystocarpic and polysporic codiicolous plants from Jamaica ((Phyc. Bor.-Am. *441*) and Barbados (Vickers, Alg. Barb. *179*) that have been distributed as *Spermothamnion gorgoneum.*

Spermothamnion macromeres Collins & Hervey, forms soft cushions about half an inch high on sand-covered rocks near the low-water mark, with Polysiphonias and other small algae, as at Pink Bay and Gravelly Bay (Phyc. Bor.-Am. *2044*). Like other members of the genus, the plant is monosiphonous and uncorticated and sends up erect branches from a creeping base. The erect branches are simple, sparingly subdichotomous, or provided with a few lateral branchlets. The cells are mostly 4–10 (–15) times as long as broad, often curved, and commonly contracted at the septa. The tripartite tetrasporangia are loosely clustered, sessile or pedicellate. Apparently endemic.

Griffithsia globulifera Harv. (*G. Bornetiana* Farl.). The Griffithsias are delicate, monosiphonous, uncorticated, cespitose plants, the filaments mostly erect and regularly dichotomous, or, in some species laterally branched. The tetrasporangia, in the Bermuda species, are borne on minute branchlets forming whorls at the upper nodes. The cystocarps also occur at the nodes and are furnished with an involucre. In *G. globulifera,* the antheridia densely

cover the apical half of the obovoid or subglobose terminal cells. The male, female, and tetrasporic plants in this species have each their characteristic habit and form of cell, the male plant being smaller, 1–3 inches high, with lower cells cylindric-obovoid, the upper pyriform, obovoid, or subglobose. In the female and tetrasporic plants the cells vary from cylindric to cylindric-clavate, cylindric-obovoid, or ellipsoid; they are mostly 4–10 times as long as broad in the lower parts and 1–4 times as long as broad in the upper, and are moderately contracted at the septa. In all forms of *G. globulifera* the branching is dichotomous or subdichotomous. The only Bermuda specimens seen are sterile and their determination is not wholly certain.

Griffithsia Schousboei Mont. is a smaller plant than *G. globulifera*, with shorter and broader cells that are very strongly contracted at the septa, giving the filaments a moniliform habit. The cells vary from cylindric-clavate below to pyriform, ellipsoid, subglobose, and oblate-spheroid above, the septal isthmi being only $\frac{1}{2}$–$\frac{1}{3}$ the maximum diameter of the cells. At the apices the filaments often diminish in diameter abruptly or gradually to cells $\frac{1}{3}$–$\frac{1}{5}$ the diameter of the larger subjacent cells. The writer has not seen antheridia in the Bermuda plants, but the species is said to have the antheridia, like the tetrasporangia, in verticils at the nodes.

Griffithsia tenuis Ag. may be recognized by its straggling habit and its irregular, mostly lateral, patent or divaricate branching. The plants are usually about two inches long, and most of the branches, which are commonly rather few, spring from near the middle, or below the middle, of an internode. In the youngest parts there are often, also, nodal verticils of very short, exceedingly delicate branchlets. The cells in the younger parts are 1–4 times as long as broad; in the older, 3–6 times. In the younger parts the filaments are often lightly contracted at the septa; in the older, they are often swollen at the septa. All specimens seen by the writer have been apparently sterile. (Phyc. Bor.-Am. *1895*.)

Callithamnion corymbosum (Sm.) Lyngb. This species forms delicate gelatinous rose-colored or brownish rose tufts mostly 1–3 inches high. The main axes are corticated in the basal parts, the main branches are several times irregularly ramified, the secondary branches are alternately pinnate with dichotomo-multifid ramuli, the ultimate ramelli corymbose-fastigiate. The cells of the main axes are variable in length but are mostly 3–8 times as long as broad and are often more or less enlarged just above the septum. The writer is inclined to refer here specimens (sterile so far as seen) collected by A. B. Hervey on various other algae at the mouth of Harrington Sound and distributed (Phyc. Bor.-Am. *1896*) as *Callithamnion Halliae* Collins, from the Key West type of which (Phyc. Bor.-Am. *698*) they differ in the corticated main axes, the longer cells, the much more corymbose-fastigiate ramelli, the frequent presence of terminal hairs, etc.

Callithamnion cordatum Børg. is a name that has been recently applied (Phyc. Bor.-Am. *2189*) to a dingy red plant 1–2 inches high found at Paddings Bay. Its ultimate ramelli are corymbose-fastigiate, somewhat as in the

foregoing species, but it differs from that and the other Bermudian species of *Callithamnion* here mentioned in having the main axes essentially uncorticated, though the extreme base of the Bermudian plant is more or less felted with both adherent and free rhizoids. The cells in the basal parts are short, being about as broad as long. The type of the species was from the Danish West Indies and the specific name was given in allusion to the cordate geminate cystocarps. The Bermudian plants seen by the writer are apparently sterile. The ultimate ramelli would seem to be stouter and less abruptly tapering than in the type as figured by Børgesen.

Callithamnion Herveyi M. A. Howe, sp. nov. Plants dingy purple, subfuscous in age, gelatinous, forming tufts or cushions 2–4 cm. high, ramification densely and repeatedly decompound, for the most part irregular or obscurely tetrastichous, the ultimate ramelli more or less subdistichous or dichotomo-distichous; main axes with rhizoidal corticatious for three fourths or more of their length, 0.3–0.35 mm. in diameter at base and in older parts loosely hirto-tomentulose with simple or irregularly branched rhizoidal ramelli; cells of the largest uncorticated branches 40–80 μ in diameter, subcylindric, mostly 1½–2 times as long as broad, their walls 12–25 μ thick; antepenultimate ramuli cylindric-plumose, mostly 0.8–1.5 mm. long, and, with the patent or erecto-patent ramelli, 0.3–0.6 mm. broad; cells of the ultimate ramelli 1½–2 (rarely 3) times as long as broad, the terminal obtuse, 8–12 μ in diameter, occasionally piliferous; dioicous; antheridia subglobose or subhemispheric, 30–50 μ in diameter, usually crowning a short but manifest one-celled pedicel; cystocarps subglobose, 100–220 μ in diameter, scarcely lobed, often geminate; tetrasporangia lateral, mostly solitary, irregularly scattered or occasionally subsecund, obovoid or subglobose, mostly 38–40 μ in maximum diameter, tetrahedrally divided or spores sometimes subdecussately paired; monosporangia terminal, frequent on cystocarpic plants, occasional on antheridial and tetrasporic plants, scattered or irregularly clustered, solitary, sometimes concatenate in twos (very rarely in threes), obovoid, ellipsoid, pyriform, or subglobose, 36–65 μ in longer liameter. [Phyc. Bor.-Am. *2046* as *Callithamnion Hookeri* (Dillw.) Ag.]

Type from Smith's Bay, December, 1913, communicated by F. S. Collins as no. *8005*, and preserved in the herbarium of the New York Botanical Garden. The species is named in honor of Rev. Dr. A. B. Hervey, author of the popular book, "Sea Mosses," and successful investigator of the marine flora of Bermuda.

Callithamnion Herveyi is perhaps most nearly related to the European *C. Hookeri*, but manifestly differs in its smaller size, in its denser, more cylindric-plumose or tetrastichous, less distichous ramification, in its more hirtulous-tomentulose main axes, in its more slender and delicate ultimate ramelli (terminal cells averaging about one half the diameter of those of *C. Hookeri*), in its much smaller tetrasporangia (averaging about one half the diameter of those of *C. Hookeri*), in the frequent presence of monosporangia, etc. The plants are often much encrusted with diatoms of various kinds, and even when virtually free from diatoms, the plants collect and hold quantities of fine sand, indicating the presence of a remarkable amount of mucus. The cystocarp has no involucre and conforms to the *Callithamnion* type—not to that of *Seirospora*. All of the cells except the youngest appear to be plurinuclear. The species is endemic so far as known.

Seirospora purpurea M. A. Howe, sp. nov. Plants purple-lake or dahlia-carmine, forming dense, more or less felted, pulvinate tufts 1–2½ cm. high, ramification repeatedly decompound, for the most part obscurely quinquefarious, the ultimate ramelli dichotomo-subdistichous and often subfastigiate; main axes 0.15–0.25 mm. in diameter at base, rather sparingly corticated for one half or more of their length by narrow-celled rhizoids, and in basal parts clothed in addition by free sometimes spirally entwined rhizoids, occasional cells of the upper ramuli also sending out elongate, free, long-celled, simple or sparingly branched rhizoids; largest uncorticated cells of the main axes 40–95 μ in diameter, subcylindric or slightly enlarged at the nodes, 1½–2½ times as long as broad, their walls 8–20 μ thick; cells of the ultimate ramelli mostly 2–4 times as long as broad, the terminal obtuse, 6–13 μ in diameter, hairs apparently wanting; dioicous; antheridia ovoid, lance-ovoid, dimidiate-ovoid, or ellipsoid, occurring singly at the nodes, erecto-patent, often incurved, 48–65 μ high, 26–40 μ broad; cystocarps somewhat hemispheric, 0.3–0.4 mm. broad, composed of free, erecto-patent, moniliform, sporogenous filaments, the ellipsoid or ovoid carpospores 35–40 μ long; tetrasporangia scattered, solitary at the nodes, obovoid or ellipsoid, 50–65 μ in maximum diameter, tetrahedrally divided. (Phyc. Bor.-Am. *2045*, as *Callithamnion byssoideum jamaicense* Collins.)

Type from a cave, Gravelly Bay, *A. B. Hervey* (Phyc. Bor.-Am. *2045*) in the herbarium of the New York Botanical Garden.

Seirospora purpurea bears some resemblance in habit to small dense conditions of *Callithamnion corymbosum* and *C. byssoides*, but is easily distinguished by the sheathing of the basal parts of the main axes by free rhizoids in addition to the corticating, by the frequently rhiziniferous cells of the smaller branches and the consequent more or less felted condition of the tufts, and more especially by having the cystocarp of a *Seirospora*, with its free sporogenous filaments, instead of the solid cystocarp of a *Callithamnion* with its common enclosing wall. The European *Seirospora? Gaillonii* (Crouan) De-Toni is possibly a nearer relative. The Jamaican *Callithamnion byssoideum jamaicense* Collins (Phyc. Bor.-Am. *443*) is manifestly a different thing. The cells of *S. purpurea* are apparently all uninucleate. Endemic.

Antithamnion cruciatum (Ag.) Naeg. is a delicate rose-colored or dingy red plant, mostly 1–2 inches high. Its main axes are rather few, its secondary branches are comparatively short and four-ranked, being opposite and decussately paired or in whorls of four. It is monosiphonous and uncorticated throughout. At the apices of the main axes, the branches and branchlets are very densely crowded, more or less incurved, more intensely colored, and, when pressed and dried, the effect is often slightly suggestive of the terminal "eye" of a peacock's tail-feather. St. George's (*Hervey*). (Phyc. Bor.-Am. *2191*.)

Crouania attenuata (Bonnem.) J. Ag. is a very gelatinous, much branched, filiform, monosiphonous, and uncorticated plant 1–4 inches long, varying in color from light rose to dingy purple. The main branches are irregular and they bear at their nodes pairs or whorls of fastigiate, erecto-patent or slightly incurved, several times dichotomous or trichotomous short branches, the successive whorls close set and confluent in the younger parts, often separate and giving a beaded or moniliform appearance in the older parts. The general habit of the plant is very suggestive of certain species of the fresh-water genus *Batrachospermum*. The younger main branches are

attenuate at the apex and often also at the base. The tetrasporangia are tetrahedrally divided and are borne near the bases of the whorled short branches. The Bermuda plants are larger, coarser, and more gelatinous than the European type and the ultimate cells of the ramelli are more obtuse, but the occurrence of apparently intermediate forms in the West Indies makes it doubtful if they may be satisfactorily distinguished from the European species. (Phyc. Bor.-Am. *2048.*)

Spyridia filamentosa (Wulf.) Harv. is a common plant growing attached to rocks in shallow water in warm bays and tide-pools, or found floating and unattached, often in loose tangled mats. It is commonly 3–6 inches high, with main branching subdichotomous or irregularly lateral, the principal axes ¼–½ line in diameter. As in the other species of the genus the branches are clothed, sometimes sparingly, with very delicate hair-like ramelli about ½ a line long, which under a hand-lens are seen to be transversely zoned, hyaline zones alternating with narrower colored ones. Under a compound microscope, the main branches are found to be corticated, the corticating cells in regular transverse zones in the younger parts, bands of narrower longer corticating cells regularly alternating with bands of broader shorter cells. This species is distinguished from the following by its looser more straggling habit and, microscopically, by the fact that the capillary ramelli are merely acute or apiculate, without recurved hooks. (Phyc. Bor.-Am. *1897.*)

Spyridia complanata J. Ag. grows on exposed rocks between the tide-lines or near low-water mark, as at Hungry Bay, Red Bay, and Spanish Rock. It is more densely branched, more plumose in habit, and usually a smaller plant than the preceding, growing 2–4 inches high, with tufted compact feathery fronds mostly ¼–½ inch broad. The main axes are slightly flattened and the branches are predominantly distichous. Many of the ramelli, besides having an apiculus, are provided with one or more minute retrorse one-celled subapical barbs or hooks. (Phyc. Bor.-Am. *1947.*)

Spyridia aculeata (Ag.) Kütz. is similar to *S. complanata,* but the branches issue in all directions, showing little tendency to be distichous. However, this character seems variable and it is doubtful if these two species can be satisfactorily distinguished, at least so far as concerns the Bermuda plants. The ends of the main branches are often enlarged and hooked, circinate, or tendril-like, as in the genus *Hypnea,* constituting the var. *hypneoides* J. Ag. (Phyc. Bor.-Am. *1946.*)

Ceramium nitens (Ag.) J. Ag. is an attractive deep red, brownish red, or yellowish red, copiously branched, thread-like plant that occurs in Hamilton Harbor, in the Inlet to Harrington Sound, etc. It forms soft rather lubricous tufts, mostly 3–5 inches high. The main branching is subdichotomous, with one or several somewhat zigzag leading axes. The smaller branches are lateral, subdivaricate or patent, and occasionally secund, and the apices are straight. Under a microscope the plant is seen to be corticated throughout and more or less nodose, with the transverse septa of the large-celled monosiphonous axis visible through the cortex. The Bermuda specimens seen are sterile. (Phyc. Bor.-Am. *1949.*)

Ceramium tenuissimum J. Ag. is a name that may be employed, temporarily at least, in accordance with current usage, for a variable, perhaps aggregate species that occurs in Bermuda. However, the proper application of the name (first used by Roth, as a varietal name) is in doubt, and, moreover, the Bermuda plants do not agree quite accurately with European plants that currently bear this name. As in the following species of the genus, the corticication is confined to a band at each node, the colored corticated nodes alternating and contrasting with the naked usually hyaline internodes, giving a transversely zoned appearance to the plant when viewed under a hand-lens. The filaments are very delicate, repeatedly dichotomous, fastigiate, mostly 1–2 inches high, $\frac{1}{25}$–$\frac{1}{15}$ of a line in diameter, the apices strongly forcipate or nearly straight and erect. The mostly cylindric internodes are 2–4 times as long as broad, becoming shorter above; nodal bands slightly protuberant, 2–6 cells wide (high), their cells irregular in form, size, and direction, 8–14 cells measuring the width of the filament. The Bermuda specimens examined are mostly sterile, but the tetrasporangia appear to be erumpent in a single extrorse secund series and are somewhat irregularly divided, sometimes resembling the so-called tetrahedral or tripartite mode and sometimes approaching the decussate-paired arrangement. (Phyc. Bor.-Am. *1898* and *2098*.)

Ceramium cruciatum Collins & Hervey, creeps on *Galaxaura squalida* on the South Shore. The erect or ascending parts are only about a line high. The filaments are several times dichotomous, and about $\frac{1}{14}$ of a line in diameter, with forcipate apices. The hyaline uncorticated internodal cells are thick-walled, often bulging, scarcely longer than broad, shorter than broad in upper parts; nodal bands hardly protuberant when sterile, 2–5 cells wide (high), their cells irregular in form and size, their long axes mostly lengthwise of the filament, 8–16 cells measuring its width. The tetrasporangia immersed, becoming erumpent, subsecund or subverticillate, the spores in decussate pairs.

Ceramium byssoideum Harv. (*C. transversale* Collins & Hervey) is an exceedingly delicate flocculent plant, reaching a length of 1–2 inches. The filaments are $\frac{1}{70}$–$\frac{1}{50}$ of a line in diameter, are repeatedly subdichotomous, the branches somewhat fastigiate or corymbose, and the apices straight and erect or slightly forcipate. The hyaline uncorticated internodal cells are cylindric below, and mostly 2–6 times as long as broad, becoming shorter above and short-fusiform, ovoid, or obovoid; nodal bands protuberant, especially above, bitruncate, 3–5 cells wide (high), their cells mostly with their longer axes running transversely of the filament, 2–6 cells measuring its width. The tetrasporangia are subsecund, protuberant, and lightly corticated in basal half, the spores irregularly tetrahedral. (Phyc. Bor.-Am. *2049*, as *Ceramium transversale* Collins & Hervey.)

Ceramium leptozonum M. A. Howe, sp. nov. Plants delicate, Indian lake or deep purplish-vinaceous, cespitose, dichotomous, fastigiate, 1½–3 cm. high; main filaments 40–72 μ in diameter, lightly corticated at nodes only, the dichotomies acute, the apices slightly forcipate or suberect; internodal cells cylindric below and 1½–4 times as long as broad, becoming ovoid and shorter above, all provided with conspicuous fibrillar chromatophores, becoming dead

orate below; nodal bands of corticating cells very narrow, slightly protuberant, mostly only one cell wide (high), the cells with their longer axes (20–40 μ) usually directed lengthwise of the filament, about four cells measuring the diameter of the filament, irregular smaller cells sometimes forming an imperfect second (upper) row; tetrasporangia solitary or 2 or 3 at a node, mostly secund along the outer side of the filament, occasionally subverticillate, 50–65 μ in maximum diameter, the primary wholly naked, the secondary (formed by regeneration) subtended by 2–4 small sterile cells and thereby often much exserted or substipitate, the tetraspores somewhat tetrahedrally disposed.

Type from a pond at Walsingham, having subterranean communication with the sea, (*Howe 99*, in herb. N. Y. Botanical Garden).

Ceramium leptozonum is related to *C. byssoideum* and the plants currently known as *C. tenuissimum*, but seems to be amply distinct in having ordinarily only a single row of corticating cells at the nodes, these cells nearly always elongate in the direction of the filament, and in the naked primary tetrasporangia. In the narrow nodal zones, the regenerating tetrasporangia, and the rather persistent coloring of the protoplasts of the large internodal cells, the species is slightly suggestive of *Ceramothamnion Codii*, from which it is easily distinguished by the apparently non-repent habit, the dichotomous stouter and taller filaments, the usually single instead of double row of nodal cells, which are also more elongate, the relatively smaller naked primary tetrasporangia, etc. *Ceramium cruciatum* and *C. tenuissimum* also sometimes show persistently colored fibrillar chromatophores in the internodal cells. In soaked-out dried specimens, the nodal cells often appear to be more numerous than they really are, owing to the segregation of chromatophores or to the purely optical cutting of these cells by the nodal diaphragm. The tetraspores sometimes germinate *in situ*, giving rise to small proliferations. The species is apparently endemic.

Ceramothamnion Codii Richards, is a small plant epiphytic on species of *Codium* along the South Shore and on Cooper's Island. It creeps along the surface of the *Codium*, sending down rhizoids among the utricles of its host and sending up erect filaments less than a line high and $\frac{1}{80}$–$\frac{1}{52}$ of a line in diameter, which are unbranched except in connection with the formation of the so-called polysporangia, the apices remaining straight and erect. The uncorticated internodal cells are mostly 1½–3 times as long as broad, and show persistently colored fibrillar chromatophores, somewhat as in *Ceramium cruciatum* and *C. leptozonum*. The nodal bands of corticating cells are 2 (3) cells wide (high), these cells with their longer axes variously directed, 3 or 4 cells measuring the width of the filament. The tetrasporangia are solitary at the nodes, subsecund, broader at maturity than the filament, subtended in the basal half by an involucral cup of sterile cells, and regenerating, the spores arranged in decussate pairs. Antheridia form compact, small-celled, subglobose, sometimes confluent enlargements of the nodes of different individuals from those that bear the tetraspores. Supposed polysporangia or parasporangia, of non-sexual origin, irregularly ovoid, subglobose or ellipsoid, occur on the erect filaments, usually in pairs, and subtended by three or four short branches similar in structure to the filaments. *Ceramothamnion* appears to differ from *Ceramium* in scarcely anything but in the occurrence of alleged polysporangia of non-

sexual origin where one would naturally expect cystocarps of sexual origin. The resemblance of the vegetative characters of *Ceramothamnion* to those of undoubted species of *Ceramium*, the occurrence of antheridia, the failure to find proved procarps and cystocarps, and the resemblance of the supposed polysporangia to the cystocarps of *Ceramium*, form a combination of circumstances that suggests the possibility that the alleged polysporangia of *Ceramothamnion* are in reality cystocarps. (Phyc. Bor.-Am. *845* and *1899; 2193*, as *Ceramium tenuissimum pygmaeum*.)

Centroceras clavulatum (Ag.) Mont. is the commonest and perhaps the most variable Bermudian representative of the Ceramiaceae, growing on rocks and on various larger algae in shallow water, or, in surf-beaten places between the tide-lines. Its capillary brownish red or dingy red dichotomous fastigiate filaments form tufts or loose mats commonly 0.5–4 inches high. The filaments are corticated throughout and may be distinguished from corticated species of *Ceramium* by having the somewhat rectangular cortex cells in regular longitudinal rows. In the younger parts at least, each node bears a whorl of teeth or short mostly 2-celled spines, by which character also it is easily distinguished from its Bermudian relatives. In the length, shape, and abundance of these spines, the plant varies greatly according to habitat, and distinctions of species based on these characters have been attempted. (Phyc. Bor.-Am. *1948*, as *Ceramium clavulatum*.)

Family **GRATELOUPIÀCEAE.**

Halymenia bermudensis Collins & Howe, has a membranous, violet-red, rather firm or slightly gelatinous, usually stipitate frond that is variable in form, mostly suborbicular, cordate, or obovate, and 2–10 inches broad, subentire or sparingly or copiously lobed or proliferous, the lobes ovate or conformable. Under a microscope, the medullary filaments viewed through the cortex are seen to be interspersed with a few coarser filaments, having more homogeneous refringent contents and radiating from substellate, ganglion-like enlargements. (Phyc. Bor.-Am. *2050*.) Apparently endemic.

Halymenia pseudofloresia Collins & Howe, has a membranous deep red or violet-red frond that is gelatinous in younger parts, becoming firmer with age, suborbicular, ovate, cuneate-obovate, or commonly very irregular in general outline, 3–10 inches long, deeply, irregularly, or subpalmately lobed, or often showing cuneate-based substipitate marginal proliferations, the main expansion or axes ½–3 inches broad, the lobes or proliferations commonly lanceolate, serrate, biserrate, or subpinnately lobulate or bilobulate, the teeth mostly acuminate-deltoid, the medulla, under a microscope, occasionally showing a few inconspicuous stellate ganglia. (Phyc. Bor.-Am. *2052*.) Apparently endemic.

Halymenia echinophysa Collins & Howe, has a membranous lilac or gray-ish vinaceous gelatinous frond that is suborbicular in general outline and 4–7 inches wide, deeply, irregularly or subpalmately lobed or divided, the lobes irregularly obovate or suborbicular, mostly 1–2½ in. broad, their margins sinuate- or crose-dentate or sparingly sublobulate. Under a microscope, lower

of the inner cells of the subcortex are seen to be enlarged, subglobose, echinate-stelliform, projecting into the medullary cavity, and showing when detached 15–40 rather rigid subspinescent processes. Known only from a specimen dredged in "31 fathoms, off Bermuda" by members of the Challenger Expedition in 1873. Apparently endemic.

Halymenia Agardhii De-Toni, has, in its Bermuda forms, a soft, dark red, subterete, repeatedly dichotomous, more or less gelatinous frond that is 3–4 inches long (commonly longer in Florida and the West Indies), with segments $\frac{1}{8}$–$\frac{1}{4}$ of an inch broad. The only known Bermuda alga with which it might possibly be confused is a species of *Nemastoma,* from which it differs in its darker red color, in its more regular dichotomy, in being less lubricous, and, microscopically, in its firmer, more pseudoparenchymatous, less obviously filamentous cortex, and the frequent anastomoses or small nodal ganglia among the medullary filaments. The plant has been found washed ashore on South Beach and growing attached to rocks near low-water mark at Gibbet Island.

Cryptonemia crenulata (J. Ag.) J. Ag. apparently occurs in Bermuda (on sand-covered rocks in a cave, Gravelly Bay, *Hervey*) in a small reduced form, and possibly better-developed conditions are yet to be found in deeper water, where it may be expected on the bases of sea-fans, dead-men's-fingers, etc. As thus far found, it has a sparingly dichotomous rose-purple membranous frond 1–2 inches long, from a subterete stipe. The main divisions are about $\frac{1}{8}$ of an inch wide, strap-shaped or cuneate-ligulate, often stipitate, subentire, occasionally with small ovate or suborbicular stipitate innovations. In normal forms of the species, the segments are $\frac{1}{4}$–$\frac{3}{4}$ inch broad and have crenulate-denticulate margins, the teeth often bifid or trifid or furnished with a small crown of secondary teeth. (Phyc. Bor.-Am. *2100.*)

Cryptonemia luxurians (Ag.) J. Ag. differs from the foregoing in having a caulescent, costate-alate frond, the costa vanishing towards the apices. The only Bermuda specimen seen is about 4 inches tall, several times dichotomous, the segments $\frac{1}{4}$–$\frac{1}{2}$ inch broad. On rocks in shallow water at Red Bay, St. David's Island (*Howe 287*).

Family **DUMONTIACEAE.**

Dudresnaya crassa M. A. Howe, is a flaccid extremely lubricous densely ramose dioicous plant that is 2–6 inches high or long and rose-colored when living, though commonly dingy purple or brownish red on drying. In the pressed and dried condition, the branching appears to be irregularly 2–3-pinnate, though the branches really emerge in all directions; branches and branchlets are vermiform, of nearly uniform diameter throughout; the ultimate branchlets are obtuse or subobtuse and mostly $\frac{1}{3}$–$\frac{2}{3}$ of a line in diameter. Under a microscope the very soft gelatinous cortex is seen to be made up of essentially free, 4–6 times dichotomous, beautifully fastigiate cylindric filaments, the more peripheral cells of which are 2–5 times as long as broad. In the younger parts, the central axis, consisting of a single row of cells, bearing the crowded whorls of peripheral filaments may be readily seen; in the older

parts this axis is clothed and obscured by numerous decurrent rhizoidal filaments. In the female plants, auxiliary-cell branches are numerous, consisting of 5–9 enlarged subspherical cells near base, the special auxiliary cell occupying the middle of this enlarged portion and having little more than half the diameter of the two immediately adjacent inflated cells. In the male plants, the antheridia form subglobose tufts or clusters at or near the ends of the peripheral filaments. The usually numerous cystocarps form granules $_{50}$–$_{15}$ of a line in diameter, easily visible under a hand-lens. The plant grows on rocks in about ten feet of water in Castle Harbor and has been found washed ashore at Spanish Point, Buildings Bay, and Shelly Bay. (Phyc. Bor.-Am. *1900* and *2196.*) Apparently endemic.

Dudresnaya bermudensis Setchell, is readily distinguished from the foregoing by its much finer taper-pointed branchlets and more slender main axes, these rarely more than $\frac{1}{3}$ of a line in diameter, and by the moniliform, rather than cylindric peripheral filaments, the outer cells subspheric, or ovoid or ellipsoid and only slightly longer than broad. The cystocarps are many-spored and $\frac{1}{25}$–$\frac{1}{15}$ of a line in diameter. Cooper's Island (*Farlow*) and Buildings Bay (*Hervey*). (Phyc. Bor.-Am. *2195.*) Apparently endemic.

Dudresnaya caribaea (J. Ag.) Setchell, often resembles *D. bermudensis* in habit, but is, generally speaking, a larger plant, 4–15 inches long, is more obviously complanate-distichous, and its main axes are often 1–2 lines broad. Microscopically, it shows moniliform peripheral filaments, much resembling those of *D. bermudensis,* but the specialized auxiliary cell is enlarged, subspheric, and terminal on the special auxiliary-cell branch, this consisting otherwise chiefly of discoid cells, instead of being intercalary and scarcely distinguishable from its neighbors. The cystocarps are few-spored and have about one-half the average diameter of those of *D. bermudensis.* Found floating at Cooper's Island (*Farlow*). Type from the Tortugas, Florida.

Family **NEMASTOMATÀCEAE.**

Calosiphonia verticillifera (J. Ag.) Setchell, has been reported by Setchell and by Collins as having been collected at Cooper's Island by Farlow in 1881. The present writer has not seen the Bermuda plants that have been given this name, but the single type specimen of *Helminthocpsis verticillifera* J. Ag., on which the name rests, appears to have the auxiliary-cell branches of a *Dudresnaya* and, in fact, to be distinguishable by no reliable character from *Dudresnaya caribaea* (J. Ag.) Setchell, the type of which also was from the Tortugas, off the coast of southern Florida.

Platoma cyclocolpa (Mont.) Schmitz (type from the Canary Islands), or an apparently sterile plant resembling it in general habit, is of occasional occurrence in Bermuda. Its soft gelatinous flattened rose-purple thallus is 1–5 inches broad and high, irregularly dichotomo multifid, or irregularly palmatifid from a plane base that is often 1–2 inches wide, the margins crenate-dentate, irregularly lobulate or bilobulate, or incised-dentate, the teeth mostly obtuse and often subterete, the plane faces occasionally showing teeth or short proliferations. In narrower forms, the main segments are sometimes irregularly subpinnate or bipinnate. From the species of *Halymenia,* it is readily distinguished by the more obviously filamentous cortex and subcortex and by the absence of anastomoses and stelliform cells. The Bermuda plants differ from

Mediterranean specimens referred to this species in their bright red color and in their softer looser cortex, its constituent filaments being more readily separable.

Nemastoma gelatinosum M. A. Howe, sp. nov. Thallus very soft, gelatinous, and lubricous, light purplish-vinaceous, forming a subhemispheric or somewhat flattened shrub-like tuft 6–13 cm. high, subterete or here and there complanate, repeatedly (5–9 times) and in general closely subdichotomous, the branching mostly in one plane or occasionally, especially toward the apices, in all directions, often crowded-subpalmate, now and then subpinnately distichous, the branches unequal, mostly 3–6 mm. in diameter or in flattened parts sometimes 10 mm. broad, slightly tapering, obtuse or subacute, occasionally terminating in a pair of small subdivaricate teeth about 1 mm. broad; medullary filaments 7–12 μ in diameter; cortex of 5 or 6 times di(tri)chotomous submoniliform fastigiate filaments 80–140 μ long, loosely imbedded in mucus and easily separable, the forkings rather wide-angled, the cells mostly obovoid, those of the surface usually 3–9 $\mu \times$ 3–6 μ; other parts unknown.

On rocks in about 3 m. of water, in Castle Harbor near Tucker's Town (type, *Howe 316*, in herb. N. Y. Bot. Gard.). Also collected in Bermuda by Faxon (in herb. Farlow). *Nemastoma gelatinosum* may possibly include the plants somewhat doubtfully referred above to *Platoma cyclocolpa*, to which it bears much resemblance in structure, but, if so, the species is remarkably protean in habit. *N. gelatinosum* is a softer, more gelatinous, usually lighter-colored, suffrutescent plant, with all parts predominantly subterete, while the so-called *Platoma cyclocolpa* is a plane membranous plant, with a marginal fringe of lobules or crenations. In its mucosity and its tenuity when pressed and dried, *N. gelatinosum* suggests the Mauritian *N. coliforme* J. Ag., to which it seems closely related, but it manifestly differs from this in its compact suffrutescent habit. Apparently endemic.

Family **SQUAMARIÀCEAE.**

Peyssonnelia rubra (Grev.) J. Ag. forms dark red or pinkish red, reniform or cuneate-orbicular, thin and rather fragile, loosely attached, membranous, often lobed crusts $\frac{1}{2}$–1 inch broad, on the bases of the larger algae and Gorgonians in deep water or on rocks near low-water mark in littoral caverns. The ventral surface is whitened with lime, mostly coating a very short tomentum of rhizoids. Superposed imbricated lobes are often developed. The cells of the upper surface, viewed from above, are polygonal, in regular radial lines. In a cave at Gravelly Bay (*Collins*).

Other species of the genus and family doubtless occur. The Squamariaceae in general have a horizontally expanded crustaceous thallus, often more or less calcified. They may usually be distinguished superficially from the crustaceous forms of the Corallinaceae by the lighter calcification, the deeper red or yellowish color, the more obvious margins, and by the absence of definite cavities or conceptacles in which the reproductive organs occur, such organs being either scattered or aggregated in superficial sori or nemathecia.

Family **CORALLINÀCEAE.**

The members of this family show a great variety in outward form, but the known Bermudian representatives of the family agree in having a strongly

calcified thallus—often so hard and rock-like as to cause them to be overlooked by the uninitiated botanical collector as being simply "calcareous concretions" or at least as not belonging to the plant kingdom. For the proper collection of many of the crustaceous forms, one needs to be equipped with a hammer and chisel, a fact that accounts in a measure for the poor representation of this family of plants even in most of the larger herbaria. In the genera *Amphiroa* and *Corallina,* the plant body is erect and regularly jointed; in the other Bermudian genera it is wholly unjointed and may be horizontally expanded and crustaceous, or lifted into dome-like or tuber-like elevations, or may be erect, subterete, ramose, and shrub-like. In our forms the reproductive bodies occur in special cavities or conceptacles, appearing usually as dome-shaped or mammilliform superficial elevations visible to the unaided eye.

Lithothamnium syntrophicum Fosl. forms firmly attached crusts $\frac{1}{10}$–$\frac{1}{4}$ of a line thick and an inch or more in diameter on stones, pebbles, and various calcareous objects at various depths. Its surface is commonly roughened by following closely the inequalities of the substratum and it may in addition develop small irregular nodules of its own. A radio-vertical section shows minute cells in obvious vertical rows, but with little or no suggestion of horizontal stratification. The tetrasporangial conceptacles are depressed, hemispheric, or somewhat irregular, about $\frac{1}{5}$–$\frac{1}{4}$ of a line in diameter, and as in other members of the genus, their roofs soon show numerous small ostioles, suggesting the cover of a pepper-box. The tetrasporangia are zonately 4-divided. The type of the species was from Bermuda, where it was first collected by Farlow. Harrington Sound (*Howe*).

Lithothamnium mesomorphum Fosl. forms thin, fragile, partially attached, irregularly lobed and proliferous crusts $\frac{1}{2}$–2 inches broad, and $\frac{1}{5}$–$\frac{1}{3}$ of a line thick, the lobes or proliferations semiorbicular or irregular and loosely imbricate. Easily distinguished from the foregoing by its partly detached, lobed or proliferous, and imbricate habit of growth. Type from Bermuda (*Farlow*).

Lithothamnium incertum Fosl. has a crustaceous base that adheres closely to rocks 1–4 ft. below the low-tide line in normally agitated water, but it soon develops erect ramified anastomosing usually flattened branches, often forming compact even-topped, sometimes subhemispheric cushions 1–2 inches high and 3–6 inches broad. The crowded terminal branches are occasionally subterete and $\frac{1}{2}$–$\frac{3}{4}$ of a line in diameter, but are more often decidedly flattened and one line or more broad, and the branching commonly shows a tendency to be confined to the plane of flattening. The conceptacles appear externally near the ends of the branches, especially the more flattened ones, as crowded depressed-hemispheric elevations $\frac{1}{4}$–$\frac{1}{3}$ of a line in diameter. A radio-longitudinal or transverse section after decalcification shows a pseudoparenchymatous structure, with the thin-walled cells in obvious strata. The general texture is rather delicate and the gases liberated in the process of decalcification commonly fill irregular lacunae in the tissues. Type from Bermuda (*Farlow*). Red Bay, St. David's Island (*Howe*).

Lithothamnium Ungeri Kjellm. has been reported from the Challenger Bank by H. B. Bigelow (Proc. Am. Acad. Arts & Sci. **40**: 587. 1905), but the type of this species was from Norway and its occurrence in Bermuda is improbable.

Melobesia farinosa Lamour. forms thin, delicate, whitish, suborbicular, calcareous crusts a line or less broad (but often confluent) on various algae, such as *Padina, Dictyota, Sargassum,* etc. The crusts in sterile parts consist of only a single layer of cells. The minute hemispheric conceptacles are $\frac{1}{21}$–$\frac{1}{14}$ of a line broad, are often crowded, and show a single central ostiole.

Melobesia bermudensis Fosl., a species known to the writer from description only, is said to form crusts of irregular outline and indefinite size on limestone. The primary crusts consist of a single layer of cells and are about $\frac{1}{70}$ of a line thick, but often one crust overgrows another until five or six may be superposed, with a thickness of $\frac{1}{14}$ of a line, a habit not exhibited by *M. farinosa.* Bermuda (*Farlow*); apparently endemic.

Lithophyllum pustulatum (Lamour.) Fosl. is found in situations similar to those favored by *Melobesia farinosa,* which it often accompanies and somewhat resembles. It has, however, a larger, thicker, firmer thallus and larger conceptacles, the thalli being 1–5 lines broad and the mammilliform conceptacles $\frac{1}{7}$–$\frac{1}{4}$ of a line in diameter.

Lithophyllum bermudense Fosl. & Howe, forms crusts $\frac{1}{2}$–1 line thick on calcareous pebbles, showing occasional wart-like excrescences, most of which are caused by its following the inequalities of the substratum. With occasional foreign inclusions and its own older strata it becomes 4 lines thick in places. A vertical section of decalcified material shows numerous (usually 30–40) layers of mostly ellipsoidal and vertically elongate cells (1–6 times as high as broad), which are arranged in regular horizontal strata as well as in vertical rows. The conceptacles are little prominent and are $\frac{1}{5}$–$\frac{2}{7}$ of a line in diameter. Type from Spanish Point (*Howe*).

Goniolithon decutescens (Heyd.) Fosl. in litt. (*G.? spectabile* Fosl.) is a frutescent much branched plant, forming depressed-hemispheric cushions 2–5 inches high and 5–12 inches broad, light rose-red in younger parts when living, soon decolorate or chalky white after collection. Its branches are terete or subterete, mostly $\frac{1}{2}$–1 line in diameter, crowded, subfastigiate, mostly somewhat curved, intertangled and much anastomosed, especially in the lower parts. Originally, there is a horizontal basal crust from which the first erect or suberect branches arise and by which it is attached, but this soon becomes overgrown and inconspicuous and is often not shown in specimens as ordinarily collected. Plants or fragments of plants primarily attached may also become free and undergo further development in an unattached condition. A thin translucent cuticle is often irregularly exfoliated, a character that suggested the first-published specific name. A radio-longitudinal section of a decalcified branch shows rather firm-walled cells in erecto-patent outwardly curved rows, those of the medullary region about twice as long as broad and in rather obvious arcuate strata. Conceptacles, which are infrequent, occur near the tips of the branches, and are hemispheric, mammiform, or conic-mammiform,

and about ½ line broad and high. Type from Bermuda (*Farlow*). In 3–6 feet of water at Tucker's Island (*Howe*).

Goniolithon intermedium Fosl. (type from Bermuda, *Wadsworth*) differs from the foregoing chiefly in its erect, nearly straight and fastigiate upper branches. In habit it is somewhat intermediate between *G. decutescens* and *G. strictum* Fosl. (type from Florida). The *G. decutescens-G. strictum* group is widely and numerously represented in the West Indian region and while the plants show great variety in form and size, specific limits, if they exist, are very difficult to define. Furthermore, the plants of this group sometimes make a close approach to the earlier-published *Goniolithon frutescens* Fosl. from the South Pacific.

Amphiroa fragilissima Lamour. In both *Amphiroa* and *Corallina*, the plant-body is more or less regularly and distinctly jointed, terete or flattened, and di-(tri-)chotomously or pinnately branched. In *Corallina*, the conceptacles are terminal; in *Amphiroa*, they are lateral, on the faces of the segments. *Amphiroa fragilissima*, as currently interpreted, has a very fragile, terete, repeatedly dichotomous thallus, forming loose or rather compact cushions 1–3 inches high and sometimes one foot or more wide. The segments are mostly $\frac{1}{15}$–$\frac{1}{7}$ of a line in diameter and are 4–10 times as long as broad; they often show annular, discoid, or geniculer enlargements at the nodes. The branches sometimes taper a little towards the extremities, but the segments are commonly of a nearly uniform diameter throughout the plant. (Phyc. Bor.-Am. *2198* and *2199*). The name of the present species goes back to *Corallina fragilissima* L. (Syst. Nat. 1: 806. 1758—ed. 10), which is based essentially on a Jamaican plant figured by Hans Sloane (Hist. Jam. *pl. 20. f. 5*)—a plant, that, so far as may be judged from the description and figure, might as well be a condition of *Corallina rubens*. Gmelin (Syst. Nat. 1: 3840. 1788) modified and probably changed completely the Linnaean conception of the species, substituting another description and figure of Sloane's for those cited by Linnaeus, and this modified conception of the species is the one that has been adopted by Lamouroux and subsequent writers. The genus *Amphiroa* is probably represented in Bermuda by two or three species, but their delimitation and correct naming, as is also true of the species of *Corallina*, awaits a more critical study of their comparative anatomy and of the pertinent historic types.

Corallina rubens L. is a name in current use for a delicate, jointed, dichotomo-fastigiate plant that forms dense pale red tufts or mats ½–1½ inches high on rocks or on stalks of *Sargassum* near the low-water mark. The segments are terete throughout or slightly flattened under the dichotomies, $\frac{1}{20}$–$\frac{1}{10}$ of a line in diameter, mostly 3–5 times as long as broad, the apical often taper-pointed. The rather infrequent terminal conceptacles are somewhat flattened urn-shaped, the shoulders often produced into a pair of horn-like or antenna-like branches. (Phyc. Bor.-Am. *2200*.)

Corallina pumila (Lamour.) Kütz. is a name that has been adopted by Collins for a minute coralline that forms tufts a little more than a line high

on the fronds of *Zonaria zonalis* along the South Shore (Phyc. Bor.-Am. *1950*). Its filaments are only 2 or 3 times dichotomous and 5–7 segments long. Its segments are 3–4 times as long as broad and have about the same diameter as those of *C. rubens*. The abundant conceptacles vary in form from turbinate and flattened urn-shaped to fusiform-clavate and are $\frac{1}{10}$–$\frac{2}{7}$ of a line long. The type of the species grew on *Turbinaria* in the Red Sea.

Sub-class **BACILLARIEAE (DIATOMEAE).**

This sharply defined group of minute organisms is of uncertain affinities. By some writers it is included under the class Algae; by others, it is excluded. If included, it is here treated in a rather unnatural sequence. However, a few words in regard to the group may be here appended.

The Diatoms are microscopic one-celled organisms that contain in addition to chlorophyl a brown pigment related to that found in the Phaeophyceae, though not identical with it. The enclosing wall consists of two separable nearly equal parts, the valves, one of which fits closely inside the other. The wall is permeated with silica, which renders the valves almost imperishable, so that the Diatoms are abundantly preserved as fossils. In most Diatoms the wall is regularly and beautifully marked with pits, meshes, ridges, and furrows of various degrees of delicacy. The Diatoms are very widely distributed, inhabiting salt, fresh, and brackish water, and moist spots on the dry land. They may float free at the surface, lie more or less free at the bottom, or may be attached to the larger algae or other aquatic objects. Some species are solitary in habit of life; others are associated in colonies, which may be ribbon-like, thread-like, or zigzag, or may sometimes form branching gelatinous filaments imitating an *Ectocarpus* or other filamentous brown algae. Many of the free-living forms have the power of slow, irregular, spontaneous locomotion when in contact with a solid substratum.

The Diatoms are, as remarked, siliceous organisms and they do not appear to be particularly abundant in calcareous seas like that washing the shores of Bermuda. However, they seem to have been little collected and studied in this region. So far as known to the writer, only sixteen species of Diatoms have been attributed to Bermuda. Most of these are listed in the papers cited in the Bibliography under O'Meara and Castracane. The type of *Navicula Janischii* Castr., now considered a form of *Dictyoneis marginata* (Lewis) Cleve, was from Bermuda.

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A general account of the vegetation. [See Hardwicke's Science Gossip **10**: 44. 1874.]

Moseley, H. N. On the Marine Algae of St. Thomas and the Bermudas, and on *Halophila Baillonis* Asch. (Journ. Linn. Soc. **14**: 311–317. 1874.)

O'Meara, E. Notes on Bermuda Diatoms. (Quart. Journ. Micr. Sci. II. **14**: 316. 1894.
Enumerates 12 species dredged in 31 fathoms on the "Southwest Bank" by the Challenger Expedition.

Petiver, James. Musei Petiveriani. (Sm. 8vo, pp. 93 + [iii]. London 1695–1703.)
In "Centuria Octava," p. 80, records receiving Bermuda plants from John Dickenson, probably the earliest reference to Bermuda Botany.

Reade, O. A. Additions to Catalogue of Plants growing in Bermuda. (Bermuda Pocket Almanack **1880**: 177–180; **1881**: 146–149.)
List of 167 species, additional to Dr. Hinson's list in the same volume.

Reade, O. A. Plants of the Bermudas or Somers' Islands. (8vo. pp. 112 + vii. Hamilton, Bermuda, 1885.)

The only descriptive flora of Bermuda heretofore published, including about 150 species of native and naturalized plants, with notes on those in cultivation. The first cover-page bears the date 1885; the title-page 1883.

Rein, J. J. Ueber die Vegetations Verhältnisse der Bermudas Inseln. (Ber. Senckenb. Nat. Gesell. Frankfurt am Main **1872–1873**: 131–153. 1873.)

A descriptive account of the islands, with lists of 128 species of flowering plants and of 109 species of marine algae.

Riddle, L. W. The Lichens of Bermuda. (Bull. Torr. Club **43**: 145–160. 1916.)

Enumerates about 80 species, 7 described as new.

Rugg, H. G. Random Notes on Bermuda Ferns. (Am. Fern Journ. **2**: 16–18. 1912.)

Seaver, F. J. Bermuda Fungi. (Mem. N. Y. Bot. Gard. **6**: 501–511. 1916.)

Enumeration, with habitats, of about 120 species, 4 described as new.

Small, H. B. Vegetation in the Bermudas. (Ottawa Nat. **12**: 101–104, 109–114, 153–157. 1898.)

Remarks upon trees, flowering shrubs, plants and flowers.

Small, H. B. The Botany of Bermuda. (Bermuda Colonist **36**: Feb. 13, 16, 20, 23, 27, Mar. 2, 6, 9, 1901. Reprinted, somewhat modified, as Botany of Bermuda, 12mo, pp. 56. 1901.)

Introduction, and popular accounts of wild and cultivated plants.

Small, H. B. Botany of the Bermudas. (Small 8vo, pp. 85, Hamilton, 1913.

A revision and rearrangement of his previous work.

Small, H. B., and Bushell, J. J. [Plants of Bermuda.] In Bushell's Handbook of Bermuda, 8vo, Bermuda 1899, pp. 60–69.

Notes on conspicuous species.

Stirton, James. Enumeration of the Lichens collected by H. N. Moseley, naturalist to H. M. S. Challenger, in the Islands of the Atlantic Ocean. (Journ. Linn. Soc. **14**: 336–375. 1874.)

Includes 25 species from Bermuda.

Stirton, James. Remarks on Mr. Crombie's Paper on the Challenger Lichens. (Journ. Linn. Soc. **17**: 154, 155. 1878.)

Verrill, A. E. The Bermuda Islands. (8vo, pp. x + 548. New Haven, 1902.)
Contains much botanical information.

Verrill, A. E. The Bermuda Islands: their Scenery, Physiography, Natural History and Geology; with Sketches of their early History and the Changes due to Man. (Proc. Conn. Acad. Arts & Sci. 11^2: 1–956. 1901–2.)
Contains much botanical information.

PRINCIPAL BOTANICAL COLLECTIONS MADE IN BERMUDA.

1. **Dickenson, J.** The oldest botanical specimens collected in Bermuda are those of John Dickenson, obtained about 1699, and preserved in the Sloane collection in the herbarium of the British Museum of Natural History, representing 12 species.

2. **Lane, A. W.** A collection of somewhat over 100 species was made by Lane prior to 1845, and is preserved in the herbarium of the Royal Gardens at Kew.

3. **Holton, I. F.** Holton, who collected extensively in Colombia and elsewhere in tropical America, touched at Bermuda in 1854 and collected some botanical specimens, which are preserved in the Torrey Herbarium of Columbia University and in the Kew Herbarium.

4. **Kemp, A. F.** As a student of algae, Kemp visited Bermuda in 1856 and made considerable collections, which are preserved in his private herbarium, which is still in the possession of his family.

5. **Jones, J. M.** As an all around naturalist, Jones made zoological collections in Bermuda prior to 1859, and subsequently established a museum for these and his other collections at Halifax. Although an author of three somewhat extensive papers on the Botany, I have not been able to ascertain if his collections are preserved. They are not now in the Provincial Museum of Halifax. It is possible that he made no botanical collections.

6. **Rein, J. J.** Rein was a tutor of the son of Governor Ord in Bermuda during at least parts of the period between 1861 and 1863, at which time he made a considerable collection, both of land plants and of algae; the specimens of land plants collected by him are preserved in the University of Goettingen and a set of duplicates at the Berlin Botanical Museum. His collections of algae are preserved in the herbarium of the Senckenberg Society at Frankfurt, Germany, and there is a set of them in the Dublin Botanical Garden and some in the Berlin Botanical Museum.

7. **Moseley, H. N.** Serving as naturalist of the Challenger Expedition, 1872–1876, Moseley collected extensively in Bermuda in 1873; his specimens are to be found in the Kew Herbarium and in the herbarium of the British Museum of Natural History.

8. **Lefroy, J. H.** During the period between 1871 and 1877, Lefroy was Governor of Bermuda; he made large botanical collections, most of which are preserved in the Kew Herbarium, and there are some of his specimens in the Gray Herbarium of Harvard University.

9. **Reade, O. A.** Reade was pharmacist at the Naval Hospital about the year 1880, and made botanical collections; a few of his specimens are to be found in the Kew Herbarium and a few of his ferns are in the Underwood Fern Herbarium of the New York Botanical Garden; presumably his collections were extensive, as his "Plants of Bermuda," published in 1883, is hitherto the only descriptive flora of the islands printed; I have been unable to ascertain if his own herbarium still exists.

10. **Farlow, W. G.** Extensive collections, mostly of cryptogams, were made in Bermuda by Farlow in the years 1880 and 1881, and these are preserved in the Cryptogamic Herbarium of Harvard University, and some duplicates are in the herbarium of the New York Botanical Garden.

11. **Kemp, J. F.** Especially interested in geology, Kemp visited Bermuda in 1885, and made a botanical collection of 50 species, preserved in the herbarium of Columbia University.

12. **Gilbert, B. D.** A diligent student of ferns, Gilbert collected these plants particularly in Bermuda, in the year 1898; a set of them is preserved in the Underwood Fern Herbarium of the New York Botanical Garden, and others in the United States National Museum and in the Gray Herbarium.

13. **Millspaugh, C. F.** Accompanying a West Indian voyage of the yacht "Utowana," in the winter of 1898–99, Millspaugh touched at Bermuda and made a botanical collection, which is preserved in the herbarium of the Field Museum of Natural History; a few duplicates are in the herbarium of the New York Botanical Garden.

14. **Richards, H. M.** In the winter of 1898 Richards made collections of algae and other plants, preserved at Barnard College, and at other institutions.

15. **Small, H. B.** A resident of Bermuda for many years, and author of several documents on its flora, Small informed me in 1913 that he

made a collection of several hundred specimens prior to 1900, which was sent to England.

16. **Howe, M. A.** For the special purpose of collecting and studying algae, Howe visited Bermuda in the summer of 1900; he obtained rich collections of these plants and also many land cryptogams; a complete series is preserved in the herbarium of the New York Botanical Garden and some duplicates have been sent to students at other institutions.

17. **Moore, A. H.** Moore visited Bermuda in the summer of 1905, and collected specimens of several hundred species, which were added to his own herbarium; there is a partial set in the Gray Herbarium; a few duplicates were sent to the New York Botanical Garden.

18. **Brown, S., and Britton, N. L.** Through cooperation of the Academy of Natural Sciences of Philadelphia and the New York Botanical Garden, aided by officials of the Bermuda Agricultural Station, collection and study of the Bermuda flora were taken up in 1905, and continued at intervals up to 1913. Mrs. Britton was a member of the expedition of 1905 and of one in the summer of 1912. Brown made collections alone during the winter of 1908 and in the spring of 1909. During a second trip made in 1912, F. J. Seaver was a member and made extensive collections of fungi; during the trip of 1913, Peter Bisset, of the United States Department of Agriculture, aided in the field work. The collections made have been divided between the New York Botanical Garden and the Academy of Natural Sciences of Philadelphia; partial duplicate sets have been sent to the United States National Museum, to the Bermuda Agricultural Station, to the Gray Herbarium of Harvard University, to the Missouri Botanical Garden, to the Royal Gardens at Kew, and to the herbarium of the Field Museum of Natural History and a few specimens to other institutions.

19. **Marble, Delia W.** In 1909, Miss Marble made collections from March to May, and her specimens of 85 species are preserved in the herbarium of the New York Botanical Garden; a few duplicates have been sent to other institutions.

20. **Harris, T. J.** During 1905 and subsequent years, while serving as Superintendent of the Agricultural Station, Harris collected many botanical specimens, which form a part of the herbarium of the Station, and duplicates were sent to the New York Botanical Garden.

21. **Flynn, Nellie F.** Mrs. Flynn, Treasurer of the Vermont Botanical Club, made a collection of botanical specimens in the spring of 1910, which is part of her private herbarium; a partial set of duplicates is preserved in the herbarium of the New York Botanical Garden.

22. **Dodge, B. O.** For mycological studies, Dodge visited Bermuda in the summer of 1911, accompanied by his wife; they obtained specimens of about 40 species of fungi, which are preserved in the herbaria of Columbia University and the New York Botanical Garden.

23. **Stevens, Miss M.** The herbarium of the Bermuda Agricultural Station contains a collection of plants made by Miss M. Stevens in the spring of 1913.

24. **Collins, F. S., and Hervey, A. B.** During recent years, both Collins and Hervey have spent much time in collecting and studying Bermuda plants, more especially the algae, complete collections of which are preserved in their herbaria, and there is a nearly complete set in the herbarium of the New York Botanical Garden; the land plants collected by Collins are preserved at the Gray Herbarium of Harvard University, with a nearly complete set at the New York Botanical Garden.

25. **Wortley, E. J.** During recent years, while serving as Director of Agriculture, Wortley has collected botanical specimens, preserved in the herbarium of the Agricultural Station and at the New York Botanical Garden.

GLOSSARY OF SPECIAL TERMS.

Acaulescent. With stem subterranean, or nearly so.

Accumbent. Cotyledons with margins folded against the hypocotyl.

Achene. A dry one-seeded indehiscent fruit with the pericarp tightly fitting around the seed.

Acicular. Needle-shaped.

Acuminate. Gradually tapering to the apex.

Acute. Sharp-pointed.

Adnate. An organ adhering to a contiguous differing one; an anther attached longitudinally to the end of the filament.

Adventive. Not indigenous, but apparently becoming naturalized.

Albumen. See *Endosperm.*

Alliaceous. Onion-like, in aspect or odor.

Alopecuroid. Resembling a foxtail.

Alternate. Not opposite; with a single leaf at each node.

Alveolate. Like honeycomb; closely pitted.

Ament. A spike of imperfect flowers subtended by scarious bracts, as in the willows.

Amphibious. At times inhabiting the water.

Amphitropous. Term applied to the partly inverted ovule.

Amplexicaul. Clasping the stem, or other axis.

Anastomosing. Connecting so as to form a well-defined network.

Anatropous. Applied to an inverted ovule with the micropyle very near the hilum.

Androgynous. Flower-clusters having staminate and pistillate flowers.

Angiospermous. Pertaining to the Angiospermae; bearing seeds within a pericarp.

Annulate. Ring-shaped or showing rings.

Anther. The part of the stamen which contains the pollen.

Antherid (*Antheridium*). The male organ of reproduction in Pteridophyta, Bryophyta and certain Fungi and Algae.

Anthesis. Period of flowering.

Apetalous. Without a corolla.

Apical. At the top, or referring to the top.

Apiculate. With a minute pointed tip.

Aplanospore. A non-motile and non-sexual cell, formed endogenously or by rejuvenescence and set free for propagation.

Apothecium (*Apothecia*). The disk-shaped organ bearing spore-sacs in some lichens.

Appressed. Lying against another organ.

Arborescent. Tree-like, in size or shape.

Archegone. The female reproductive organ in Pteridophyta and Bryophyta.

Areolate. Reticulated.

Areolation. The system of meshes in a network of veins.

Areole. A mesh in a network of veins.

Aril. A fleshy organ growing about the hilum.

Arillate. Provided with an aril.

Aristate. Tipped by an awn or bristle.

Aristulate. Diminutive of aristate.

Ascending. Growing obliquely upward, or upcurved.

Ascus (*Asci*). A sac containing spores.

Asexual. Without sex.

Assurgent. See *Ascending.*

Auricled (*Auriculate*). With basal, ear-like lobes.

Auxillary cell. A specialized cell, in certain Red Algae, in which a fertilized egg or one of its descendant nuclei finds lodgment and develops into a cystocarp.

Awn. A slender bristle-like organ.

Axil. The point on a stem immediately above the base of a leaf.

Axile. In the axis of an organ.

Axillary. Borne at, or pertaining to, an axil.

Baccate. Berry-like.

Barbellate. Furnished with minute barbs.
Basifixed. Attached by the base.
Berry. A fruit with pericarp wholly pulpy.
Bilabiate. With two lips.
Bipinnate. Twice pinnate.
Bipinnatifid. Twice pinnatifid.
Blade. The flat expanded part of a leaf or a petal.
Bract. A leaf, usually small, subtending a flower or flower-cluster, or a sporange.
Bracteate. With bracts.
Bracteolate. Having bractlets.
Bractlet. A secondary bract, borne on a pedicel, or immediately beneath a flower; sometimes applied to minute bracts.
Bulb. A bud with fleshy scales, usually subterranean.
Bulblet. A small bulb, especially those borne on leaves, or in their axils.
Bulbous. Similar to a bulb; bearing bulbs.
Caducous. Falling away very soon after development.
Caespitose. Growing in tufts.
Calcified. Coated or permeated with lime.
Callosity. A small, hard protuberance.
Callus. An extension of the inner scale of a grass spikelet; a protuberance.
Calyx. The outer of two series of floral leaves.
Campanulate. Bell-shaped.
Campylotropous. Term applied to the curved ovule.
Cancellate. Reticulated, with the meshes sunken.
Canescent. With gray or hoary fine pubescence.
Canaliculate. Channelled; longitudinally grooved.
Capitate. Arranged in a head; knob-like.
Capsular. Pertaining to or like a capsule.
Capsule. A dry fruit of two carpels or more, usually dehiscent by valves or teeth.
Carinate. Keeled; with a longitudinal ridge.
Carpel. The modified leaf forming the ovary, or a part of a compound ovary.
Caruncle. An appendage to a seed at the hilum.
Carunculate. With a caruncle.
Caryopsis. The grain; fruit of grasses, with a thin pericarp adherent to the seed.
Caudate. With a slender tail-like appendage.
Caudex. The persistent base of perennial herbs, usually only the part above ground.
Caudicle. Stalk of a pollen-mass in the Orchid and Milkweed families.
Cauline. Pertaining to the stem.
Cell. A cavity, of an anther or ovary; a microscopic protoplasmic unit.
Cespitose. (See *Caespitose.*)
Chaff. Thin dry scales.
Chalaza. The base of the ovule.
Chartaceous. Papery in texture.
Chlorophyll. Green coloring matter of plants.
Chlorophyllous. Containing chlorophyll.
Chromatophore. A specialized color-bearing protoplasmic body.
Ciliate. Provided with marginal hairs.
Ciliolate. Minutely ciliate.
Cilium. A hair.
Cinereous. Ashy; ashy-colored.
Circinnate. Coiled downward from the apex.
Circumscissile. Transversely dehiscent, the top falling away as a lid.
Clavate. Club-shaped.
Cleistogamous. Flowers which do not open, but are pollinated from their own anthers.
Cleft. Cut about halfway to the midvein.
Clinandrium. Cavity between the anther-sacs in orchids.
Cochleate. Like a snail shell.
Coma. Tuft of hairs at the ends of some seeds.
Commissure. The contiguous surfaces of two carpels.
Conceptacle. A cavity containing reproductive cells and opening outwards.
Conduplicate. Folded lengthwise.
Confluent. Blended together.
Connate. Similar organs more or less united.

Connective. The end of the filament, between the anther-sacs.
Connivent. Converging.
Convolute. Rolled around or rolled up longitudinally.
Coralloid. Resembling coral.
Cordate. Heart-shaped.
Coriaceous. Leathery in texture.
Corm. A swollen, fleshy base of a stem.
Corolla. The inner of two series of floral leaves.
Corona; Crown. An appendage of the corolla; a crown-like margin at the top of an organ.
Coroniform. Crown-like.
Cortex. The bark, rind, or superficial layer of tissue.
Cortical. Pertaining to the cortex.
Corymb. A convex or flat-topped flower-cluster of the racemose type, with pedicels of rays arising from different points on the axis.
Corymbose. Borne in corymbs; corymb-like.
Costate. Ribbed.
Cotyledon. A rudimentary leaf of the embryo.
Crenate. Scalloped; with rounded teeth.
Crenulate. Diminutive of crenate.
Crustaceous. Crustose. Hard and brittle; crust-like.
Cryptostoma. A small superficial pit, bearing hairs or paraphyses, in certain Algae.
Cucullate. Hooded, or resembling a hood.
Culm. The stem of grasses and sedges.
Cuneate. Wedge-shaped.
Cusp. A sharp stiff point.
Cuspidate. Sharp-pointed; ending in a cusp.
Cyme. A convex or flat flower-cluster of the determinate type, the central flowers first unfolding.
Cymose. Arranged in cymes; cyme-like.
Cystocarp. A multicellular spore-bearing body of sexual origin, in the Red Algae.
Deciduous. Falling away at the close of the growing period.
Decompound. More than once divided.
Decumbent. Stems or branches in an inclined position, but the end ascending.
Decurrent. Applied to the prolongation of an organ, or part of an organ running along the sides of another.
Decussate. In alternating pairs, crossing at right angles.
Deflexed. Turned abruptly downward.
Dehiscence. The opening of an ovary, anther-sac or sporange to emit the contents.
Dehiscent. Opening to emit the contents.
Deltoid. Broadly triangular, like the Greek letter delta.
Dentate. Toothed, especially with outwardly projecting teeth.
Denticulate. Diminutive of dentate.
Depauperate. Impoverished, small.
Depressed. Vertically flattened.
Dextrorse. Spirally ascending to the right.
Diadelphous. Stamens united into two sets.
Diandrous. Having two stamens.
Dichotomous. Forking regularly into two nearly equal branches or segments.
Dicotyledonous. With two cotyledons.
Didymous. Twin-like; of two nearly equal segments.
Diffuse. Loosely spreading.
Digitate. Diverging, like the fingers spread.
Dimorphous. Of two forms.
Dioecious. Bearing staminate flowers or antherids on one plant, and pistillate flowers or archegones on another of the same species.
Dioicous. (See *Dioecious.*)
Discoid. Heads of Compositae composed only of tubular flowers; rayless; like a disk.
Disk. An enlargement or prolongation of the receptacle of a flower around the base of the pistil; the head of tubular flowers in Compositae.
Dissected. Divided into many segments or lobes.
Dissepiment. A partition-wall of an ovary or fruit.

Distal. Pertaining to the outer or apical part or part away from point of attachment.
Distichous. Arranged in two rows.
Distinct. Separate from each other; evident.
Divaricate. Diverging at a wide angle.
Divided. Cleft to the base or to the mid-nerve.
Dorsal. On the back, pertaining to the back.
Drupaceous. Drupe-like.
Drupe. A simple fruit, usually indehiscent, with fleshy exocarp and bony endocarp.
Drupelet. Diminutive of drupe.
Echinate. Prickly.
Ellipsoid. A solid body, elliptic in section.
Elliptic. With the outline of an ellipse; oval.
Emarginate. Notched at the apex.
Embryo. A rudimentary plant in the seed.
Embryo-sac. The macrospore of the flowering plants, contained in the ovule.
Endemic. Growing naturally only within a definite geographic area.
Endocarp. The inner layer of the pericarp.
Endogenous. Forming new tissue within.
Endosperm. The substance surrounding the embryo of a seed; albumen.
Ensiform. Shaped like a broadsword.
Entire. Without divisions, lobes, or teeth.
Ephemeral. Continuing for only a day or less.
Epigynous. Adnate to or borne on the upper part of the ovary.
Epiphytic. Growing on other plants, but not parasitic.
Equitant. Folded around each other; straddling.
Erose. Irregularly margined, as if gnawed.
Evanescent. Early disappearing.
Evergreen. Bearing green leaves throughout the year.
Excurrent. With a tip projecting beyond the main part of the organ.
Exfoliating. Peeling off in layers.
Exocarp. The outer layer of the pericarp.
Exogenous. Forming new tissue outside the older.
Exserted. Prolonged past surrounding organs.
Exstipulate. Without stipules.
Extrorse. Facing upward.
Falcate. Scythe-shaped.
Farinaceous. Starchy, or containing starch.
Fascicle. A dense cluster.
Fascicled. Borne in dense clusters.
Fastigiate. Stems or branches which are nearly erect and close together.
Fenestrate. With window-like markings.
Fertile. Bearing spores, or bearing seed.
Fertilization. The mingling of the contents of a male and female cell.
Ferruginous. Color of iron-rust.
Fetid. Ill-smelling.
Fibrillose. With fibres or fibre-like organs.
Filament. The stalk of an anther, the two forming the stamen; any thread-like structure.
Filamentous. Composed of thread-like structures; thread-like.
Filiform. Thread-like.
Fimbriate. With fringed edges.
Fimbrillate. Minutely fringed.
Fistular. Hollow and cylindric.
Flabellate. Fan-shaped, or arranged like the sticks of a fan.
Flaccid. Lax; weak.
Flexuous. Alternately bent in different directions.
Floccose. With loose tufts of wool-like hairs.
Foliaceous. Similar to leaves.
Foliolate. With separate leaflets.
Foliose. Leaf-like.
Follicle. A simple fruit dehiscent along one suture.
Follicular. Similar to a follicle.
Forcipate. Forking and connivent, like a pair of forceps.
Foveate. Foveolate. More or less pitted.
Free. Separate from other organs; not adnate.
Frond. The leaves of ferns.
Frutescent. Fruticose. More or less shrub-like.
Fugacious. Falling soon after development.

Fugitive. Plants not native, but occurring here and there, without direct evidence of becoming established.

Funiculus. The stalk of an ovule or seed.

Fuscous. Dusky, grayish brown.

Fusiform. Spindle-shaped.

Galea. A hood-like part of a perianth or corolla.

Galeate. With a galea.

Gametangium. A gamete-bearing organ.

Gamete. A unisexual protoplasmic body, commonly microscopic.

Gametophyte. The sexual generation of plants.

Gamopetalous. With petals more or less united.

Gemma. A bud-like propagative organ.

Gibbous. Enlarged or swollen on one side.

Glabrate. Nearly without hairs.

Glabrous. Devoid of hairs.

Gladiate. Like a sword-blade.

Gland. A secreting cell, or group of cells.

Glandular. With glands, or gland-like.

Glaucous. Covered with a fine bluish or white bloom; bluish-hoary.

Globose. Spherical or nearly so.

Glomerate. In a compact cluster.

Glomerule. A dense capitate cyme.

Glumaceous. Resembling glumes.

Glume. The scaly bracts of the spikelets of grasses and sedges.

Granulose. Composed of grains.

Gregarious. Growing in groups or colonies.

Gynobase. A prolongation or enlargement of the receptacle supporting the ovary.

Habit. General aspect.

Habitat. A plant's natural place of growth.

Hastate. Halberd-shaped; like sagittate; but with the basal lobes diverging.

Haustoria. The specialized roots of parasites.

Head. A dense round cluster of sessile or nearly sessile flowers.

Herbaceous. Leaf-like in texture and color, pertaining to an herb.

Heterocyst. An enlarged, commonly inert, often yellowish cell, in certain filamentous Algae.

Hilum. The scar or area of attachment of a seed or ovule.

Hirsute. With rather coarse stiff hairs.

Hispid. With bristly stiff hairs.

Hispidulous. Diminutive of hispid.

Hyaline. Thin and translucent.

Hypocotyl. The rudimentary stem of the embryo; also termed *radicle.*

Hypogynium. Organ supporting the ovary in some sedges.

Hypogynous. Borne at the base of the ovary, or below.

Imbricated. Overlapping.

Imperfect. Flowers with either stamens or pistils, not with both.

Incised. Cut into sharp lobes.

Included. Not projecting beyond surrounding parts.

Incumbent. With the back against the hypocotyl.

Indehiscent. Not opening.

Indusium. The membrane covering a sorus.

Inequilateral. Unequal-sided.

Inferior. Relating to an organ which arises or is situated below another.

Inflexed. Abruptly bent inward.

Inflorescence. The flowering part of plants; its mode of arrangement.

Integument. A coat or protecting layer.

Internode. Portion of a stem or branch between two successive nodes.

Introrse. Facing inward.

Involucel. A secondary involucre.

Involucrate. With an involucre, or like one.

Involucre. A whorl of bracts subtending a flower or flower-cluster.

Involute. Rolled inwardly.

Irregular. A flower in which one or more of the organs of the same series are unlike the others.

Isidiose. Lichenological term for wart-like excrescences.

Labiate. Provided with a lip-like organ; belonging to the family Labiatae.

Laciniate. Cut into narrow lobes or segments.

Lacunose. Showing perforations or depressions.

Lamina. The blade of a leaf, a leaf-like expansion, or a layer.
Lanceolate. Considerably longer than broad, tapering upward from the middle or below; lance-shaped.
Latex. The milky sap of certain plants.
Leaflet. One of the divisions of a compound leaf.
Legume. A simple dry fruit dehiscent along both sutures.
Lenticular. Lens-shaped.
Ligulate. Provided with or resembling a ligule.
Ligule. A strap-shaped organ, as the rays in Compositae.
Limb. The expanded part of a petal, sepal, or gamopetalous corolla.
Linear. Elongated and narrow with sides nearly parallel.
Lineolate. With fine or obscure lines.
Lobed. Divided to about the middle.
Lobule. A small lobe.
Loment. A jointed legume, usually constricted between the seeds.
Loculicidal. Applied to capsules which split longitudinally.
Lodicules. Minute hyaline scales subtending the flower in grasses.
Lunate. Crescent-shaped.
Lyrate. Pinnatifid, with the terminal lobe or segment considerably larger than the others.
Macrosporange. Sporange containing macrospores.
Macrospore. The larger of two kinds of spores borne by a plant, usually giving rise to a female prothallium.
Mammillate. Having breast-shaped or teat-like processes.
Marcescent. Withering but remaining attached.
Medulla. The pith, the axillary or middle tissue.
Medullary. Pertaining to the pith or medulla.
Mericarp. One of the carpels of the Umbelliferae.
Mesocarp. The middle layer of a pericarp.
Micropyle. Orifice of the ovule, and corresponding point on the seed.
Microsporange. Sporange containing microspores.
Microspore. The smaller of two kinds of spores borne by a plant, usually giving rise to a male prothallium; pollen-grain.
Midvein (*Midrib*). The central vein or rib of a leaf or other organ.
Monadelphous. Stamens united by their filaments.
Moniliform. Like a string of beads.
Monoecious. Bearing stamens and pistils on the same plant, but in different flowers.
Monoicous. (See *Monoecious.*)
Monosiphonous. Of a single series of cells, end to end.
Monstrous. Unusual or deformed.
Mucronate. With a short sharp abrupt tip.
Mucronulate. Diminutive of mucronate.
Muricate. Roughened with short hard processes.
Muriform. Like bricks in a wall.
Muticous. Pointless, or blunt.
Mycelium. The vegetative part of a fungus.
Naked. Lacking organs or parts which are normally present in related species or genera.
Naturalized. Plants not indigenous to the region, but so firmly established as to have become part of the flora.
Nectary. A sugar-secreting organ.
Nemathecium. A wart-like elevation, in certain Algae, containing tetraspores or other reproductive cells.
Nitent. Shining, polished, glistening.
Node. The junction of two internodes of a stem or branch, often hard or swollen, at which a leaf or leaves are usually borne.
Nodose. Similar to nodes or joints; knotty.
Nodulose. Diminutive of nodose.
Nut. An indehiscent one-seeded fruit with a hard or bony pericarp.
Nutlet. Diminutive of nut.
Obcordate. Inversely heart-shaped.
Oblanceolate. Inverse of lanceolate.
Oblong. Longer than broad, with the sides nearly parallel, or somewhat curving.
Obovate. Inversely ovate.
Obovoid. Inversely ovoid.
Obsolete. Not evident; gone, rudimentary, or vestigial.
Obtuse. Blunt, or rounded.
Ochreae. The sheathing united stipules of Polygonaceae.
Ochreolae. The ochreae subtending flowers in the Polygonaceae.

Ochroleucous. Yellowish white.
Olivaceous. Olive-green.
Oösphere. The cell of the archegone which is fertilized by spermatozoids.
Operculate. With an operculum.
Operculum. A lid.
Orbicular. Approximately circular in outline.
Orthotropous. Term applied to the straight ovule, having the hilum at one end and the micropyle at the other.
Ostiole. A little orifice.
Ovary. The ovule-bearing part of the pistil.
Ovate. In outline like a longitudinal section of a hen's egg.
Ovoid. Shaped like a hen's egg.
Ovule. The macrosporange of flowering plants, becoming the seed on maturing.
Palate. The projection from the lower lip of two-lipped personate corollas.
Palet. A bract-like organ enclosing or subtending the flower in grasses.
Palmate. Diverging radiately like the fingers.
Panicle. A compound flower-cluster of the racemose type, or cluster of sporanges.
Paniculate. Borne in panicles or resembling a panicle.
Papilionaceous. Term applied to the irregular flower of the Pea Family.
Papilose. With minute blunt projections.
Pappus. The bristles, awns, teeth, etc., surmounting the achene in the Chicory and Thistle Families.
Parasitic. Growing upon other plants and absorbing their juices.
Parietal. Borne along the wall of the ovary, or pertaining to it.
Parted. Deeply cleft.
Patent. Spreading, open.
Pectinate. Comb-like.
Pedicel. The stalk of a flower in a flower-cluster, or of a sporange.
Peduncle. Stalk of a flower, or a flower-cluster, or a sporocarp.
Pedunculate. With a peduncle.
Peltate. Shield-shaped; a flat organ with a stalk on its lower surface.
Penicillate. With a tuft of hairs or hair-like branches.
Perfect. Flowers with both stamens and pistils.
Perfoliate. Leaves so clasping the stem as to appear as if pierced by it.
Perianth. The modified floral leaves (sepals or petals), regarded collectively.
Pericarp. The wall of the fruit, or seed-vessel.
Pericentral. Surrounding the central axis.
Perigynium. The utricle enclosing the ovary or achene in the genus *Carex*.
Perigynous. Borne on the perianth, around the ovary.
Peripheral. Pertaining to the periphery.
Perithecium (*Perithecia*). An organ containing spore-sacs.
Persistent. Organs remaining attached to those bearing them after the growing period.
Petal. One of the leaves of the corolla.
Petaloid. Similar to petals; petal-like.
Petiolate. With a petiole.
Petiolule. The stalk of a leaflet.
Petiole. The stalk of the leaf.
Phyllode. A bladeless petiole or rachis.
Pilose. With long soft hairs.
Pinna. A primary division of a pinnately compound leaf.
Pinnate. Leaves divided into leaflets or segments along a common axis.
Pinnatifid. Pinnately cleft to the middle or beyond.
Pinnule. A division of a pinna.
Pistil. The central organ of a flower containing the macrosporanges (ovules).
Pistillate. With pistils; and usually employed in the sense of without stamens.
Placenta. An ovule-bearing surface.
Plicate. Folded into plaits, like a fan.
Plumose. Resembling a plume or feather.
Plumule. The rudimentary terminal bud of the embryo.
Pluriloculer. Having many cells or compartments.
Podetium (*Podetia*). Stalk-like organs in certain lichens.

Pollen. Pollen-grain. See *Microspore.*

Pollinia. The pollen-masses of the Orchid and Milkweed Families.

Polygamous. Bearing both perfect and imperfect flowers.

Polypetalous. With separate petals.

Polysiphonous. Consisting of bundles of parallel cells.

Polysporangium. A sporangium containing many spores.

Pome. The fleshy fruit of the Apple Family.

Procarp. The female reproductive organ of the Red Algae.

Procumbent. Trailing or lying on the ground.

Proliferous. Producing offshoots.

Prophylla. Bractlets.

Prothallium. The sexual generation of Pteridophyta.

Proximal. Pertaining to the inner or basal part, or the part near the point of attachment.

Pseudoparenchyma. A compact tissue, in Fungi and Algae, formed by closely interlaced or united filaments.

Puberulent. With very short hairs.

Pubescent. With hairs.

Punctate. With translucent dots or pits.

Pungent. With a sharp stiff tip.

Pyriform. Pear-shaped.

Raceme. An elongated determinate flower-cluster with each flower pedicelled.

Racemose. In racemes, or resembling a raceme.

Rachilla. The axis of the spikelet in grasses.

Rachis. The axis of a compound leaf, or of a spike or raceme.

Radiant. With the marginal flowers enlarged and ray-like.

Radiate. With ray-flowers; radiating.

Radicle. The rudimentary stem of the embryo; hypocotyl.

Radicular. Pertaining to the radicle or hypocotyl.

Ramulose. Having many small branches.

Ramulus. A little branch or a branchlet of the ultimate order.

Raphe (*Rhaphe*). The ridge connecting the hilum and chalaza of an anatropous or amphitropous ovule; the ridge on the sporocarp of *Marsilea.*

Ray. One of the peduncles or branches of an umbel; the flat marginal flowers in Compositae.

Receptacle. The end of the flower stalk, bearing the floral organs; or, in Compositae, bearing the flowers; also, in some ferns, an axis bearing sporanges.

Recurved. Curved backward.

Reflexed. Bent backward abruptly.

Regular. Having the members of each part alike in size and shape.

Reniform. Kidney-shaped.

Repand. With a somewhat wavy margin.

Reticulate. Arranged as a network.

Retrorse. Turned backward or downward.

Retuse. With a shallow notch at the end.

Revolute. Rolled backward.

Rhachis. See *Rachis.*

Rhizoid. A root-like filament in the lower plants.

Rhizome. See *Rootstock.*

Rootstock. A subterranean stem, or part of one.

Ringent. The gaping mouth of a two-lipped corolla.

Rostellum. Beak of the style in Orchids.

Rostrate. With a beak.

Rosulate. Like a rosette.

Rotate. With a flat round corolla-limb.

Rugose. Wrinkled.

Runcinate. Sharply pinnatifid, or incised, the lobes or segments turned backward.

Sac. A pouch, especially the cavities of anthers.

Saccate. With a pouch or sac.

Sagittate. Like an arrow-head, with the lobes turned downward.

Samara. A simple indehiscent winged fruit.

Saprophyte. A plant which grows on dead organic matter.

Scabrous. Rough.

Scale. A minute, rudimentary or vestigial leaf.

Scape. A leafless or nearly leafless stem or peduncle, arising from a subterranean part of a plant, bearing a flower or flower-cluster.

Scapose. Having scapes, or resembling a scape.

Scarious. Thin, dry, and translucent, not green.

Scorpioid. Coiled up in the bud, or in the beginning of growth, unrolling in expanding.

Secund. Borne along one side of an axis.

Segment. A division of a leaf or fruit.

Sepal. One of the leaves of a calyx.

Septate. Provided with partitions.

Septicidal. A capsule which splits longitudinally into and through its dissepiments.

Serrate. With teeth projecting forward.

Serrulate. Diminutive of serrate; serrate with small teeth.

Sessile. Without a stalk.

Setaceous. Bristle-like.

Setose. Bristly.

Silicle. A silique much longer than wide.

Silique. An elongated two-valved capsular fruit, with two parietal placentae, usually dehiscent.

Sinuate. With strongly wavy margins.

Sinuous. In form like the path of a snake.

Sinus. The space between the lobes of a leaf.

Siphon. One of the usually elongate cells occurring in bundles and forming the thallus or its axis in certain Red Algae.

Soralium (*Soralia*). Powder-like pustules in lichens.

Soredium (*Soredia*). In lichens, small clusters of algal and fungal cells.

Sorus (*Sori*). A group or cluster of sporanges; a heap of spores; a circumscribed superficial bed or matrix, including reproductive cells.

Spadiceous. Like or pertaining to a spadix.

Spadix. A fleshy spike of flowers.

Spathaceous. Resembling a spathe.

Spathe. A bract, usually more or less concave, subtending a spadix.

Spatulate. Shaped like a spatula; spoon-shaped.

Spermatozoids. Cells developed in the antherid, for the fertilization of the oösphere.

Spicate. Arranged in a spike; like a spike.

Spike. An elongated flower-cluster or cluster of sporanges, with sessile or nearly sessile flowers or sporanges.

Spikelet. Diminutive of spike; especially applied to flower-clusters of grasses and sedges.

Spinose. With spines, or similar to spines.

Spinule. A small sharp projection.

Spinulose. With small sharp processes or spines.

Sporange(*ium*). A sac containing spores.

Spore. An asexual propagative cell.

Sporocarp. Organ containing sporanges or sori; a few- or many-celled spore-bearing body of sexual origin.

Sporogenous. Generating or bearing spores.

Sporophyte. The asexual generation of plants.

Spreading. Diverging nearly at right angles; nearly prostrate.

Spur. A hollow projection from a floral organ.

Squarrose. With spreading or projecting parts.

Stamen. The organ of a flower which bears the microspores (pollen-grains).

Staminodium. A sterile stamen, or other organ in the position of a stamen.

Standard. The upper, usually broad, petal of a papilionaceous corolla.

Stellate. Star-like.

Sterigmata. The projections from twigs, bearing the leaves, in some genera of Pinaceae.

Sterile. Without spores, or without seed.

Stichidium. A specialized branch bearing tetrasporangia, in the Red Algae.

Stigma. The summit or side of the pistil to which pollen-grains become attached.

Stipe. The stalk of an organ.

Stipitate. Provided with a stipe.

Stipules. Appendages to the base of a petiole, often adnate to it.

Stipulate. With stipules.

Stolon. A basal branch rooting at the nodes.

Stoloniferous. Producing or bearing stolons.
Stoma (*Stomata*). The transpiring orifices in the epidermis of plants.
Strict. Straight and erect.
Strigose. With appressed or ascending stiff hairs.
Stroma.
Strophiole. An appendage to a seed at the hilum.
Strophiolate. With a strophiole.
Style. The narrow top of the ovary.
Stylopodium. The expanded base of a style.
Subacute. Somewhat acute.
Subcordate. Somewhat heart-shaped.
Subcoriaceous. Approaching leathery in texture.
Subfalcate. Somewhat scythe-shaped.
Subligneous. Somewhat woody in texture.
Subsessile. Nearly sessile.
Substratum. The substance on which a plant grows.
Subterete. Nearly terete.
Subulate. Awl-shaped.
Subversatile. Partly or imperfectly versatile.
Succulent. Soft and juicy.
Suffrutescent. Almost or somewhat shrubby.
Sulcate. Grooved longitudinally.
Superior. Applied to the ovary when free from the calyx; or to a calyx adnate to an ovary.
Suture. A line of splitting or opening.
Symmetrical. Applied to a flower with its parts of equal numbers.
Syncarp. A fleshy multiple or aggregate fruit.
Tendril. A slender coiling attachment organ.
Terete. Circular in cross section; cylindric.
Ternate. Divided into three segments, or arranged in threes.
Tetradynamous. With four long stamens and two shorter ones.
Tetrasporangium. A sporangium containing four spores.
Tetraspore. A spore formed by the division of the mother-cell into four parts.
Tetrastichous. Arranged in four ranks.
Thalline. Pertaining to a thallus.
Thallus. A plant body, usually flat, showing no differentiation into stem, leaves, and true roots.
Thyrsoid. Like a thyrsus.
Thyrsus. A compact panicle.
Tomentose. Covered with tomentum.
Tomentulose. Diminutive of tomentose.
Tomentum. Dense matted wool-like hairs.
Torsion. Twisting of an organ.
Tortuous. Twisted or bent.
Tracheae. The canals or ducts in woody tissue.
Tracheids. Wood-cells.
Triandrous. With three stamens.
Tricarpous. Composed of three carpels.
Trichogyne. The special receptive organ of a procarp.
Trimorphous. Flowers with stamens of three different lengths or kinds; in three forms.
Triquetrous. Three-sided, the sides channeled.
Truncate. Terminated by a nearly straight edge or surface.
Tuber. A thick short underground branch or part of a branch.
Tubercle. The persistent base of the style in some Cyperaceae; a small tuber.
Tuberculate. With rounded projections.
Turbinate. Top-shaped.
Uliginous. Inhabiting mud.
Umbel. A determinate, usually convex flower-cluster, with all the pedicels arising from the same point.
Umbellate. Borne in umbels; resembling an umbel.
Umbellet. A secondary umbel.
Umbelloid. Similar to an umbel.
Uncinate. Hooked, or in form like a hook.
Undulate. With wavy margins.
Unilocular. Having one cell or compartment.
Urceolate. Urn-shaped.
Utricle. A bladder-like organ; a one-seeded fruit with a loose pericarp; the sac-like end of one of the cortex-forming filaments of certain Algae.
Valvate. Meeting by the margins in the bud, not overlapping; dehiscent by valves.

Vascular. Relating to ducts or vessels.

Vein. One of the branches of the woody portion of leaves or other organs.

Veinlet. A branch of a vein.

Velum. A fold of the inner side of the leaf-base in *Isoetes.*

Velutinous. Velvety; with dense fine pubescence.

Venation. The arrangement of veins.

Ventral. Pertaining to the lower or inner side.

Vernation. The arrangement of leaves in the bud.

Verrucose. Warty or wart-like.

Versatile. An anther attached at or near its middle to the filament.

Verticil. See *Whorl.*

Verticillate. With three or more leaves or branches at a node; whorled.

Vesicle. A small bladder-like structure.

Vestigial. In the nature of a vestige or remnant.

Villous. With long soft hairs, not matted together.

Virgate. Wand-like.

Whorl. A group of three similar organs or more, radiating from a node; Verticil.

Whorled. See *Verticillate.*

Winged. With a thin expansion or expansions.

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